

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Large Drawing Press.

Our illustration shows an improved drawing and stamping press by E. W. Bliss, 17 Adams street, Brooklyn, N. Y. This press, called the "No. 7," is a considerable modification and improvement on other presses of the same character previously built in this establishment. One of the leading features is that the parts are balanced so that no counterweights are needed. In the double guides at the left-hand end of the shaft is a yoke surrounding the cam, which carries the blank-holder up, its motion being transmitted by an equalizing bar at the top. In most of the presses built by Mr. Bliss this work is done by a single cam, which occupies the space between two rolls, and both raises and lowers the blank-holder. In the new press three cams are used. Two, which are upon the arms of the crank, carry the blank-holder down, while a third, shown in the yoke, raises it. The advantage of this is that the form of the cam can be made so that the "dwells" and motion are better adjusted. More power can be gained and the blank-holder can be raised quicker—in fact, the working surfaces of the main cams are laid out independent of all considerations except that of the work and the time in which the different motions are performed. The form of the return cam is then the resultant of the other motions and is determined by the other cams. As is usual with these presses, the cams being on the crank arms, the main journal bearings come close up to them, leaving no portion of the shaft unsupported. The press is intended to take a 30-inch blank and turn out work 22 inches in diameter. The weight of the press is 18 tons, and it is suitable for manufacturing all sorts of pressed-iron and sheet-metal shelf goods. The means for making adjustments, taking up lost motion, materials, &c., need little mention, as they are similar in character to other presses by Mr. Bliss which we have described in former issues.

## Letters of Credit.

A suit begun by Drexel & Co., the bankers, of this city, London and Paris, against Mr. Henry Huddy, is calculated to attract a large share of attention among traveled Americans and Americans who propose to travel abroad. It really involves the integrity of the letter-of-credit system, is remarkable as being the first case of the kind ever brought, and as involving banking houses in France, England, Holland and America.

The history of the case is interesting and is briefly told. In the summer of 1881 Mr. Huddy took his wife and his sister-in-law abroad. Before leaving Philadelphia he secured a letter of credit from Drexel & Co., so drawn that he was privileged to draw against it in pounds sterling through Morgan & Co., the London branch of the Philadelphia house, or in France through Drexel, Harjes & Co., the Paris branch. On August 19, 1881, Mr. Huddy and his party arrived in Frankfurt, having previously established relations with Drexel, Harjes & Co. On the same day they started for Saint Maurice, and at Heidelberg they left the train for refreshment. The station was crowded, and while returning from the restaurant Mr. Huddy and his wife were persistently jostled by a party of men, of whose appearance in the confusion they could get no clear idea. Mr. Huddy carried his letter of credit and 300 francs in money in a wallet in an inner breast pocket of his coat. A moment after he regained his compartment in the train he discovered that his coat had been unbuttoned, and that he had been robbed of his wallet and its contents. None of his party could speak German, but they were relieved from this dilemma by an English gentleman on the same train, who, at Mr. Huddy's dictation, telegraphed the facts of the robbery to Drexel, Harjes & Co. from Karlsruhe, which is an hour's ride from Heidelberg. On the day following a second dispatch was sent to the Paris bankers from Zurich, and Mr. Huddy says that in reply to this letter he was notified by the firm that the letter had been canceled. This set his mind at rest, as he believed that the thief would not succeed in negotiating any drafts against the letter of credit. He was amazed a few weeks subsequently, upon his return from Paris, to learn that the pickpocket had succeeded in having the letter of credit cashed for its full amount—\$5,000—by Hoyake & Co., bankers, in Amsterdam, and correspondents of the London and Paris branches of Drexel & Co.

To obtain the money the thief had to forge the signature of Mr. Huddy, and in view of this fact the latter concluded that the Amsterdam house would have to bear the loss accruing from its own negligence in cashing the forged letter. When he returned to this country, however, he learned that Hoyake & Co. had secured themselves by transferring to their own credit \$5,000 of the fund of Morgan & Co., of London. In turn the London house charged up the amount to Drexel & Co., of this city, who now sue Mr. Huddy, holding him on the guarantee, though he never drew a dollar against the letter. Mr. Huddy made extensive inquiries in Europe, and, so far as he can ascertain, his was the first case in which money had been obtained on a letter of credit lost, by theft or otherwise, by its proper owner. Among travelers it is deemed remarkable that a letter of credit for so considerable an amount should have been paid in full on one day, as this one was. The

thief succeeded in getting his money on the day following that on which he committed the robbery. The bankers allege negligence against Mr. Huddy, but that gentleman says he proposes to make this case a test as to whether a person to whom a letter of credit is issued can be held responsible for its pay-

## Timber Wealth of Wisconsin.

Statistics prove that Wisconsin yet possesses a large territory covered with valuable timber—not pine alone, but other varieties—which, it is thought, will yet prove a source of great wealth to that State. There

Wisconsin are irregularly distributed through the State. Four counties are estimated at 12,000,000 cords, in addition to some timber of commercial value. Valuable oak timber exists in large quantities in some counties, and hardwoods are found distributed through all the southern portion of the forest area of the State. The cut of the hardwoods for this year was 117,041,000 feet, exclusive of 86,545,000 staves and 7,448,000 set headings. The cedar swamps scattered through the pine belts of the State cover an area of some 1,065,000 acres, and are estimated to contain 62,800,000 posts, telegraph poles and railroad ties, in addition to large quantities of tamarack and spruce.

**The Chinese Coal Trade.**—Statistics show that the importation of anthracite coal into Shanghai is increasing, and in 1881 reached nearly 5000 tons. The local consumption of this coal is limited, being chiefly used for house and blacksmiths' purposes, and it is generally shipped on vessels loading kerosene oil and sundry cargo as ballast. Formerly there was a greater demand for this coal, as the American navy vessels used it in preference to other kinds, but they now use in its place cheap Takasima dust coal, which is much less expensive. With regard also to the trade of North Formosa, a correspondent at Amoy states that the trade in

## Horizontal Flange Punch.

Messrs. Hilles & Jones, of Wilmington, Del., are making a new line of machines for flange punching which will be of value to iron shipbuilders, boiler-makers and others having holes to punch in flanges, angle iron, &c. The tool shown here is called a "Horizontal Flange Punch." The slide works horizontally, the gap being placed in a vertical position. The No. 3 machine has a gap of 42 inches in depth, and will punch  $\frac{3}{4}$ -inch iron. It will be seen from the dotted lines in the cut that the frame is carried some distance beneath the floor, bringing the bottom of the gap within a few inches of floor level. Such a machine will punch flanges of all shapes, bent angle iron, &c., and as the gearing, pulleys and balance-wheels are all below the top of the machine, the punching may be done from inside or outside without difficulty. Holes can also be punched in wide sheets, both before and after they are bent to circle. Of the deep-gap pattern three styles are made, one having a 30-inch gap, which will punch  $\frac{3}{4}$ -inch iron, the second having a 36-inch gap for  $\frac{3}{4}$ -inch iron, and the third the one we have mentioned. The arrangement of the gearing keeps the fast and loose pulleys above the level of the floor, and brings the clutch into convenient position, so that it can be marked by the lever handle near the jaw. The frame is of great strength and rigidity. Brackets on the sides of the jaw just below the gap rest upon the floor, and carry the weight of the forward end of the machine. We need say little in regard to the value of a machine of this kind, since its merit will be easily seen and appreciated by a large class of iron-workers in both light and heavy metal.

## Eight-Hour Law Claims.

Governor Butler, of Massachusetts, has written the following letter relative to the enforcement of the eight-hour law:

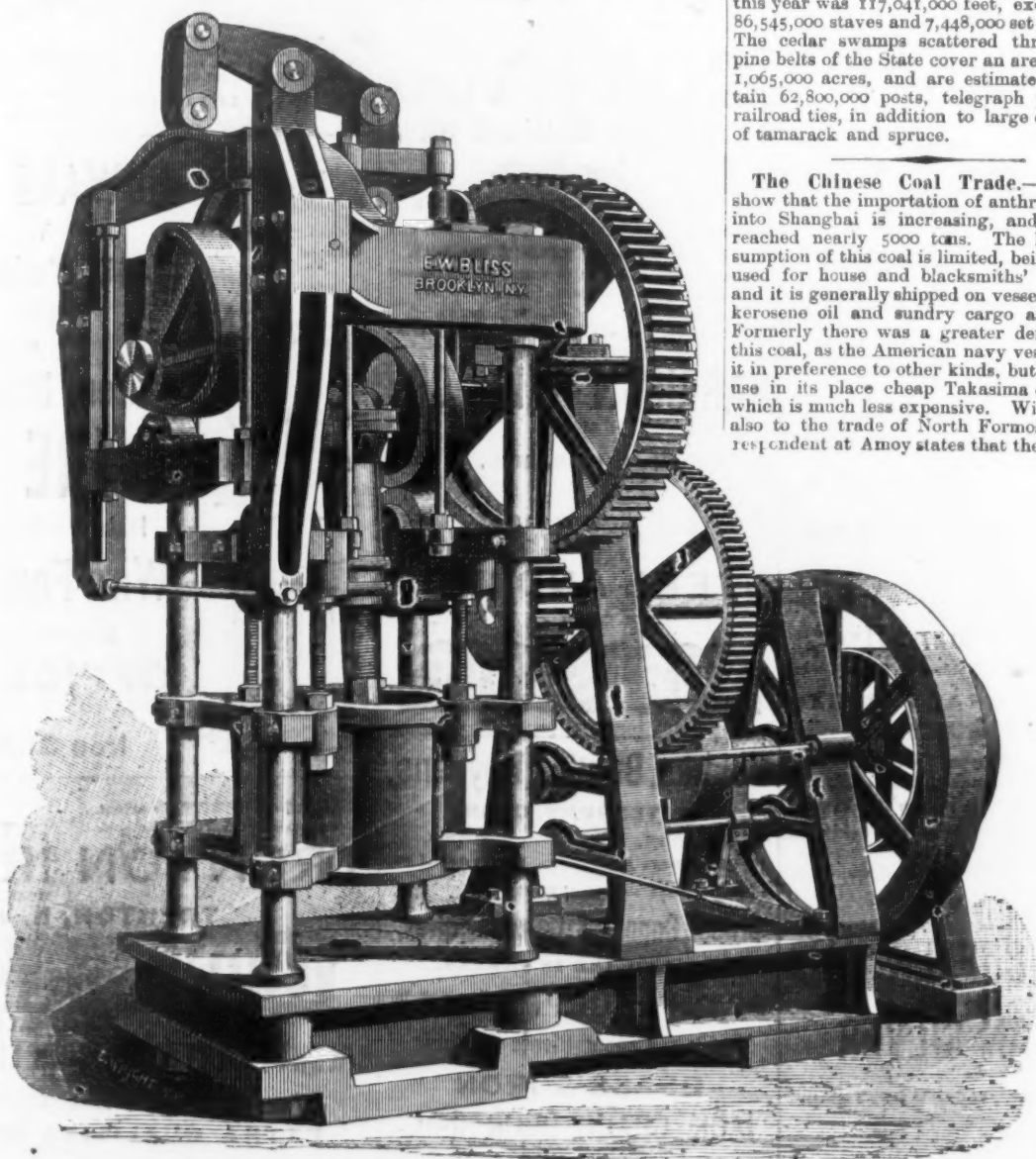
BOSTON, MASS., March 5, 1883.

MY DEAR SIR: Mr. Barrett and myself have filed a petition, of which I inclose you a copy, in the Court of Claims, which will test the rights of all mechanics laboring for the Government under the eight-hour law. I suppose that when we get judgment, if we do in that court, the United States will appeal to the Supreme Court, so that it may be some considerable time before we can get the questions of law decided. Meanwhile, a large number of those claims will "outlaw." That is, the Statute of Limitations will run against them, so that it will be necessary to file a petition in each case to save our rights. But that probably will not be necessary until next fall. Meantime, I propose that a large number of petitions from every arsenal, navy-yard and Government workshop in the United States be prepared and forwarded to Washington and presented to the next Congress at its first session, and see if they will not order the claims paid without the trouble of going through the courts. I believe Congress will do it if called upon. That is what ought to be done, and the laboring men saved the cost and trouble of litigating all these cases.

This performance of the Government in nullifying almost the only law that has been passed for the benefit of the workmen directly is not creditable to the administration of justice and law in this country. Why officers of the United States, whose duty is simply to execute the law, should set aside a plain provision of law is inexplicable, especially when that law is in favor of the mechanic, who ought to be favored by the Government, if anybody. I observe that such officers do not nullify any law in favor of large corporations, railroads, banks and others, and more than that, whenever anybody holding a bond of the United States, which is only another class of claims under a law of Congress—for which no more valuable consideration is paid than the labor which the mechanic gives to the Government under a law of Congress which fixes their rate of pay—is asked to take his pay in the same currency that the mechanic receives for his labor, there is instantly a howl about repudiation, and everybody who suggests such a thing is called a repudiator. I submit to you and to the judgment of any candid man, which is the repudiator—the officer who deliberately sets aside the law of Congress, nullifies it, which Jackson threatened to hang the South Carolinians for, or the man who believes there should be one currency for the rich and the poor. Please say to your fellow laborers that we will do the best we can to get for them their rights under the difficulties that surround us. This letter will be an answer to the many inquiries made both to you and us upon this question.

Yours truly,

BENJAMIN F. BUTLER.  
JACOB M. DAVIS, Esq., Navy Yard, Philadelphia, Pa.



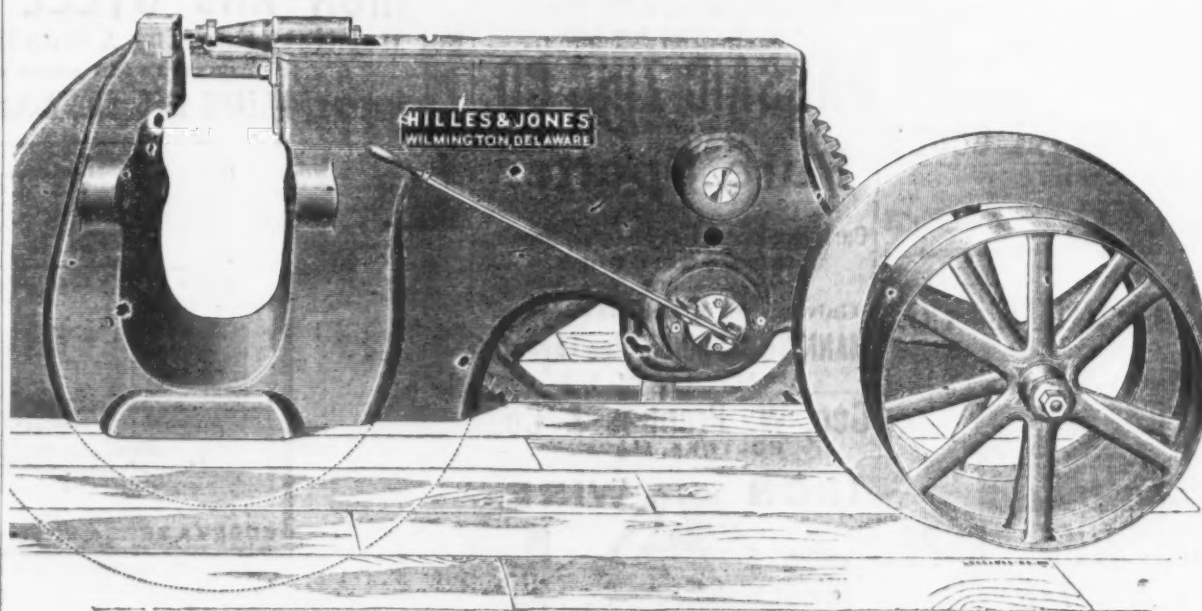
NEW DRAWING PRESS.—MADE BY E. W. BLISS, ADAMS STREET, BROOKLYN, N. Y.

ment if he should lose it, and the finder should obtain the money by forging the owner's signature.

Attorney-General Cassidy, who represents Mr. Huddy, says that the guarantee will give the banking house no protection in the face of a forgery. That the letter of credit, as paid,

are within her limits 22,500,000 acres of pine forests alone, which gradually change in character and decrease in productiveness as it advances northward, where lakes become more common and swamps occupy a considerable portion of the area. The pine trees are smaller and more scattered, al-

coal is confined principally to the port of Keelung; the supplies for the use of steamers are obtained at Tamsui also. The Keelung coal trade is becoming of some importance since the opening of the Government colliery at Coal Harbor, and the business has assumed a steadiness of character which



NEW HORIZONTAL FLANGE PUNCH, BUILT BY HILLES & JONES, WILMINGTON, DEL.

was a forgery is not disputed, and to hold his client responsible would be, he says, equivalent to making letters of credit menaces rather than a means of convenience and protection to those to whom they were issued. The case is likely to be brought to trial before the summer begins to Europe begins, and its determination, one way or another, is likely to have a marked effect on the letter-of-credit branch of the business of bankers.

though generally less intermixed with hardwood, and the lumber they yield is of a poorer quality than further south. The aggregate amount of standing pine is 44,000,000,000 feet. The cut for the year aggregated 2,087,289,000. There were manufactured 1,700,000,000 shingles and 348,301,000 laths. Of this amount of cut lumber 485,552,000 feet were manufactured along the Mississippi River, in Illinois, Iowa and Missouri, as far south as St. Louis. The hardwoods of

it did not possess in the days when merchants were dependent entirely on supplies obtainable from Chinese-worked mines. The coal fields in North Formosa are described as being very extensive, especially along the Keelung River; but Tamsui might also be made a coaling port if the Government chose to extend their operations, or if permission were granted to Chinese to open up more mines on the hills north as well as south of the Tamsui River.

It is reported that at some of the forts along the Rio Grande, on the frontier, where fuel is scarce, the War Department pay 70 cents per bushel (25 pounds) for charcoal, and \$5.75 per cord for wood. The wood used is mezquite, a superior fuel, which produces an excellent charcoal for blacksmith's purposes. In the smelting works in St. Louis Potosi, Mexico, charcoal costs from \$32 to \$35 per metric ton, or from 27 to 32 cents per bushel of 20 pounds.



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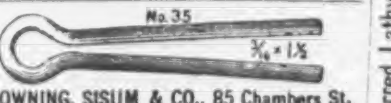
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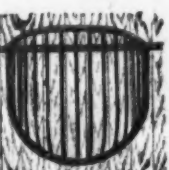
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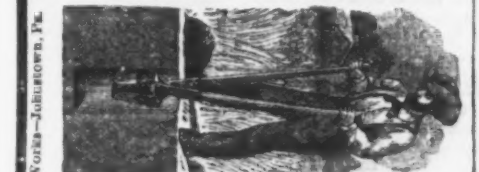
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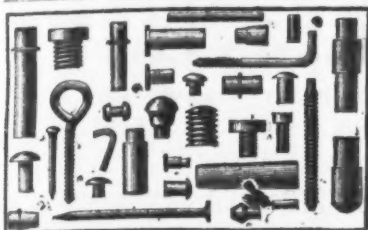
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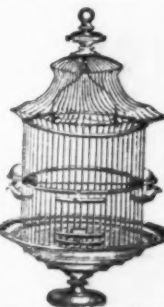
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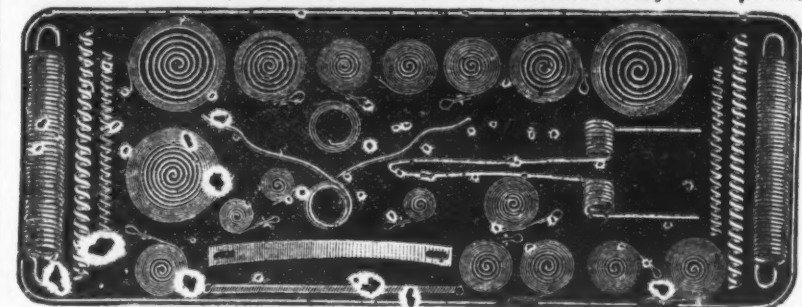
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**Political Union with Canada.**

Dr. P. Bender, a Canadian, in an article in the *North American Review*, calls attention to the fact that Canada needs our enterprise and our markets; that for want of them her citizens are emigrating to America, and that she cannot get on so well alone—for geographical reasons among others—as she can with our assistance. There was a time in recent years when this feeling did not exist. Our enormous debt at the close of the war was "held up, in *terrorem*, before Canadian eyes to excite contentment with their situation and aversion to 'Yankee connection,'" but when the debt began to be paid off in huge installments, the achievement "proved an impressive advertisement of the resources of the Republic." Meanwhile, the debt in Canada advanced rather than diminished in size. Whereas, in 1867 it was only \$93,046,051, in 1881 it was \$191,861,537. Dr. Bender does not overlook the fact that there exists in Canada a loyal section of the population who would stoutly oppose annexation, but along with them there are "multitudes, even of British Protestants, who set the slightest possible value on the connection with England, which they were only too glad to escape from in order to better their condition. They consider the people of the United States a race with which they must have business and social relations, and among whom many of them may sooner or later take up their permanent abode. The Republic, in their estimation, affords them the most profitable sphere for their energies, and vast numbers of them annually enter it to push their fortunes. The fact that there is scarcely a family in the Dominion, French, German or British, but has members or relatives living in the United States, operates as a mighty moral force in the interest of peace and closer communion. The feeling toward England is very different. However much she may be admired and loved by a great portion of the colonists, the masses of Canada feel that their fortunes, with those of their children's children, are involved in the fate of this northern continent. As all men are influenced by their own interests, it is easy to understand that the trading classes would like free access to larger markets, which political and commercial union would afford. They keenly feel, particularly in times of depression, that their field of operations is very limited, with a population of only 4,000,000 scattered over a territory nearly 4000 miles from east to west, with little more than an attenuated line of frontier and river settlements. Most Canadians are aware that the United States offer every variety of climate, as well as of vegetable productions, to suit all constitutions, tastes and necessities. The vast development of their manufacturing and mining industries, together with the rapid settlement of their wild lands, holds out substantial prospects of profitable employment to all comers, of whatever race or craft. In fact, the marvelous expansion of the industry, commerce and population of the Republic during the last 20 years, despite the terrible losses, panics and demoralization resulting from the civil war, has produced a profound impression upon all Canadians."

Republicanism, we are told, is growing every day more popular in Canada; not that the bulk of the people "concern themselves much with the merits of republicanism or monarchy in the abstract." They, however, do draw practical conclusions as to the successful operation of republicanism in the United States. The following is the writer's conclusion: "The difficulties besetting the formation of a united, compact state out of a chain of widely scattered Provinces, reaching from the Atlantic to the Pacific, appear insuperable. Dumb-bell-like, the greatest bulk and weight is at each end, the connecting-bar being represented by some 1200 miles of lacustrine shores, rocky deserts and portages, varied by swamps and lakelets—the forbidding, silent wilderness stretching from the headwaters of the Ottawa to Thunder Bay, and thence to Manitoba. What, then, can a candid thinker conclude from the above facts, save that the present and future interests of the Provinces of Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward's Island can be best promoted by a close and friendly union with the American Republic? The Northern and Eastern States adjoin these Provinces, and supply them their nearest and most profitable markets, and have long been connected with them by the bonds of good neighborhood and mutual trade. There is everything in the natural, social and commercial circumstances of the two countries to favor such a happy consummation, which could not fail to gratify the pride, stimulate the energies and enormously augment the wealth and resources of the two young Anglo-Saxon nations of North America. Already over 1,000,000 of Canadians, French and British, intelligent and enterprising, have founded homes in the Republic, the number yearly increasing. There is no reason why the remainder should not sensibly anticipate the future and unite their and their country's fortunes with the greatest and most prosperous nation the world has ever known."

Chicago claims to have 266 establishments engaged in the manufacture of iron, of which 8 are barbed wire works, 15 wire works and wire-cloth works, 28 machinery manufacturers, 6 file works, 3 cutlery works, 2 chain manufacturers and 4 car-wheel works. Capital invested is \$17,400,000; workmen engaged, 18,600; value of product, \$45,255,000. The manufacturers engaged in the furniture line foot up 353. Capital, \$10,595,000; workmen, 16,339; value of product, \$32,000,000. There are 116 firms engaged in the manufacture of wood and iron. Capital invested, \$8,525,000; workmen engaged, 8085; value of product, \$10,065,000. Outside of iron there are 136 firms engaged. Capital, \$3,000,000; workmen, 2690; product, \$5,670,000. In leather there are 113 firms employed. Capital, \$8,000,000; workmen, 6474; product, \$17,725,000. In chemicals the figures are 106 establishments. Capital invested, \$7,370,000; workmen, 3603; product, \$18,500,000.

After a preliminary test of six months, to get things in perfect working order, a trial of electric light was made in a large Cal-

ifornia railway station during June, July, August and September, 1882. There were 40 lights in operation and the power was furnished by a 50-horse engine. The following was the result of the experiment:

Average cost per month.....	\$295.23
Average cost per night.....	17.90
Average number of lights nightly.....	30.09
Average hours of lighting nightly.....	5
Average cost of one light nightly.....	\$6.56
Average cost per light per hour.....	.11

The lights were magnificent, but the cost was double that at which the station might have been fairly lighted by gas.

**Greatest Ringing Bells.**

We extract the following from a paper on bells, by John W. Nystrom, published in the *Journal of the Franklin Institute*:

Russia is famous for having the greatest bells in the world, but if the great *Tzar Kolokol* of Moscow, which has never served the purpose of a bell, be excluded, then Burmah takes the honor of having the largest ringing bells. The Burmah bell founders appear to have attained great perfection in that art, and they take great pride in their production. The quality of tone of the Burmah bells is said to be very fine. The Mengoon bell is the greatest ringing bell in the world, weighing 201,600 pounds, and its probable diameter is 203 inches. The great bell in Rangoon, called *Maha Ganda*, weighs 95,000 pounds, with probable diameter of 155 inches, and is said to have a very fine tone.

The first great bell in Moscow was presented to St. Ivan's Church by the Tzar Boris Godunov, in the 16th century. This bell was actually hung and rung, but its weight, 288,000 pounds, was too great for its support; it fell and broke, and was recast in the year 1654. Diameter, 216 inches, and sound bow, 18 inches. During the fire in 1706 the bell fell and broke again. The greatest bell in the world is that at Moscow, called *Tzar Kolokol*, or monarch bell. Its dimensions are 19 feet 3 inches high; diameter, 22 feet 8 inches; thickness of sound bow nearly 2 feet, and weight, 443,772 pounds. The weight has evidently been calculated, because the Russians had no scale upon which it could be weighed. From the dimensions of the bell, taken by the writer, and the weight calculated, it should weigh nearly 500,000 pounds. According to the inscription on the bell, it was cast in the year 1733. In those days they had no means of transporting heavy weights, and great bells were therefore cast in the church yards, close to where the bell was to be hung, as was the case with the great Moscow bell, which was cast in a pit close to St. Ivan's Church, in which tower it was intended to be hung. The molding of the bell was probably done in the ordinary way—namely, the core was built first, upon which the thickness of metal was laid with loam or clay, and the cope built over it. Judging from the unevenness of the inside surface of the bell, it is probable that the core was not swept, but dubbed up, so that the bell is not of even thickness at equal distances from the lip. The outside surface is very even, and has evidently been swept by a steady sweep. In preparing and melting the metal for casting the bell it appears that no exact composition was attempted, for the nobles and other capitalists of Moscow threw a great amount of silver and other metal into the furnace, which made it an uncertain alloy, with much greater shrinkage than the minimum, which is 31 parts of tin to 100 of copper. The molding, casting and precautions for cooling and shrinkage of a bell of this size require more practical experience than probably these bell founders were in possession of, for it is evident that the bell broke by shrinkage in the pit in which it was cast.

The cooling of a bell of this size requires a time of at least one month, if not six weeks, from the day it is cast, but it appears that the bell founders attempted to dig up the bell a few days or a week after it was cast, and it is also said that water was poured on the mold or casting; at all events, the bell was cooled too quickly, and cracked in several places around the lip, and in one place a piece weighing about 11 tons was broken off. The uneven thickness of metal also aided the breaking. The great Moscow bell has therefore never been sounded, but laid in its casting-pit, partly uncovered, for a term of 103 years, in which time it was held in reverence by the natives, who were extremely jealous of its being touched or measured by strangers. Thus it lay as an object of wonder to travelers, and the people of Moscow visited it with pride at their festivals. In the year 1836 the Emperor Nicholas decided to have the bell exhumed and raised, which was accomplished with great difficulty and expense. The engineers who first undertook to raise the bell were not given a fair chance to accomplish the work, because on their first trial the tackle was too light and gave way, for which the engineers, it is said, were sent to the mines of Siberia. The Board of Admiralty then undertook to raise the bell, and succeeded in placing it in a position south of St. Ivan's Church, on an open plaza in the Kremlin, near to where it was cast. It is said that the Empress Anne presented the bell to the church, but however that may be, it is known that the fragments of the bell which fell and broke in 1706 were used, and the citizens of Moscow contributed largely to the metal in the bell, which contains much silver and some gold. It is said that the value of the metal in the bell is \$332,000, all unreculating and dead money, for the bell has never struck a note.

In some records of the great Moscow bell it is stated that the bell was actually hung and rung in the tower of St. Ivan's Church, and that it had been broken by falling to the ground. It is also stated that the building over the casting-pit took fire after the bell was cast, and the water used for putting out the fire fell on the bell in the pit and caused its breaking. But these records have been contradicted by competent judges. The form of the bell and its bas-relief ornaments are masterpieces of fine art. Omitting the accidental unevenness of thickness, the proportions of the bell indicate that its constructor understood the acoustic properties of the vibrating metal when a bell is tolled. Our modern celebrated bell-founders are far behind that constructor in proportioning bells for quality of sound. I should like very



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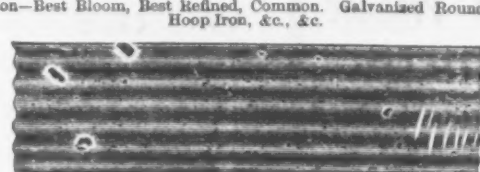
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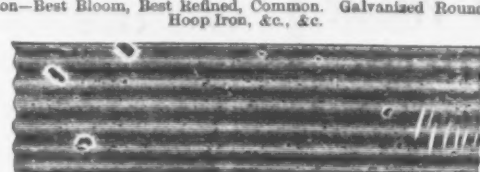
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much to see the Tzar Kolokol recast the  
same size, and the form and ornaments ex-  
actly preserved. With our present knowl-  
edge and experience in founding, the recast  
bell would be a success.

The other great bells in Moscow and other  
places are noted in the accompanying table,  
in their order of sizes. The Russians have  
generally a great number of bells of different  
sizes in their churches, but they are not  
toned for musical harmony or melody, and  
their ringing is not agreeable to strangers,  
who often make severe remarks upon their  
noise. During my five years in Russia I  
could never get accustomed to or appreciate  
the bell-ringing, which is a disagreeable  
jangling. The great bell in St. Ivan's  
Church is rung three times a year, and pro-  
duces a tremendous effect throughout the city,  
like distant thunder or the low notes of a  
powerful organ. The old bells of Russia are  
much better in tone than modern bells cast in  
Moscow 25 years ago or thereabout, but I  
have information that they make better bells  
now. The Russians never swing their bells,  
but hang them stationary, and even the  
smallest church bells are rung by ropes  
attached to the clappers.

THE LARGEST RINGING BELLS IN THE WORLD.

Names and Location of Bells.	Date Cast.	Diameter. Inches.	Weight. Pounds.
Moscow, Tzar Kolokol	1873	272	443,772
Burmah, Mengoon	2037	201	201,600
Moscow, St. Ivan's	1810	185	127,350
Fekin, Great Bell	116	116	120,000
Burmah, Maha Ganda	155	155	95,000
Nishni Novgorod	1741	174	69,664
Moscow, Church of Redeemer	1870	116.37	60,730
Nankin, China	1112	112	45,000
London, St. Paul's	1687	111.25	42,000
Olmutz, Bohemia	131	131	40,320
Vienna, Austria	1711	110	40,200
Westminster, London	1856	113.5	35,620
Erfurt, Saxony	1487	109.6	30,800
Notre Dame, Paris	1780	107	28,600
Montreal, Canada	1847	101	28,600
York, England	1841	100	24,080
St. Peter's, Rome	1786	97.25	18,000
Great Tom, Oxford	1689	95	17,034
Cologne, Germany	1477	95	16,018
Brussels, Belgium	1871	95.81	13,848
State House, Philadelphia	1875	88	13,000
Lincoln, England	1814	82.85	12,096
St. Paul's, London	1716	81	11,500
Exeter, England	1678	76	10,080
Old Lincoln, England	1610	75.5	9,896
Westminster, London	1857	73	8,950

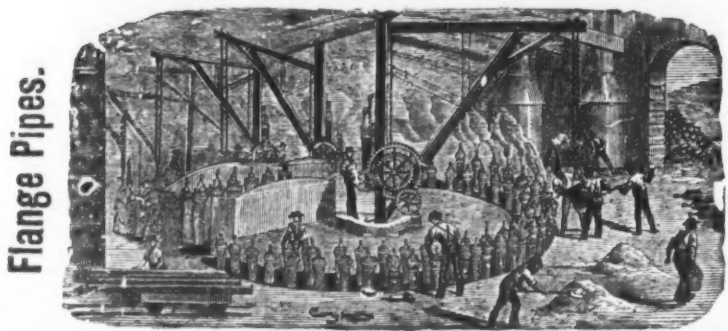
China is next in order of great bells, but  
their awkward form and projecting orna-  
ments make them far inferior in tone to our  
bells. The great bell in Pekin weighs 120,-  
000 pounds, diameter 13 feet, and height 14  
feet 6 inches. It is rung by one man strik-  
ing its outside by a wooden mallet. An ordi-  
nary iron clapper would probably break  
the bell, on account of its irregular distri-  
bution of metal. The great bell of Nankin  
weighs 45,000 pounds. Large bells are very  
common in all cities of China, but are bad in  
tone, and chime-ringing is unknown there.  
The construction of Chinese bells shows ab-  
solute ignorance of the science of acoustics  
as applied to that art.

In Japan ringing bells are very common,  
and are a little better than those in China.  
They make the bells cylindrical, with a  
spherical top, and ring them by a weight  
hung on a rope striking the bell outside.  
The Chinese and Japanese bells require  
double the amount of metal for the same vol-  
ume of sound produced by our bells. The  
ancient literature—that is, from the year  
1495 to the end of the last century—was rich  
on bells, and the subject was treated by able  
scientific men. A civil judge, Maginus Tin-  
tunatus, in the Venetian service at Candia,  
when besieged by the Turks in the year 1571,  
was taken prisoner, and in his captivity  
amused himself by writing a treatise on  
bells, which is said to be the best written on  
that subject; but, as the Turks considered  
the bell as a symbol of sinful infidelity, the  
author was beheaded by the order of a  
pasha. The manuscript was, however, pre-  
served and published, by which his name is  
immortal. When the Turks took Constanti-  
nople, in 1453, they forbade the ringing of  
bells, for the purpose of preventing signals  
being given for popular revolt. The art of  
bell-founding has not advanced in this  
century, but has gone backward in many  
cases, which proves conclusively that a good  
bell cannot be produced by practical experi-  
ence alone, but a scientific knowledge of  
acoustics is necessary with experience, not  
only for making a good bell, but also for  
producing the maximum volume of sound  
with the minimum quantity of metal.

**The Bank of England.**  
Some idea of the immensity of the busi-  
ness of the Bank of England may be formed  
from the fact, stated by the London Globe,  
that it has paid during the last five years, in  
round numbers, no less than 77,745,000  
notes, the original value of which was over  
£1,750,626,600. The Bank of England is  
the sole issuer of English currency, which  
is accepted at its face value the world  
over. Besides doing a general discount  
business, the Bank of England is the de-  
pository for all other English banks. Its  
money balance is the money balance of the  
realm, and to keep it in a safe proportion is  
to regulate the mon. situation of the  
Kingdom. The Bank of England is owned  
and managed by private stockholders for  
their own profit. Its note issue is about  
£33,000,000. As a safeguard it does not  
reissue a note. "It is," says the London  
Globe, "beneath the dignity of the bank to  
take, or to appear to take, advantage of  
accidents to their notes, and if there is any  
possibility of establishing the identity of  
any one of them, it is sure to be duly  
honored. Even where a note is entirely  
destroyed, proper evidence of the fact of  
destruction will be accepted and payment  
made. A lost note will in some cases be  
paid, and there is one occasion recorded  
upon which the liberal attitude of the di-  
rectors in a case of this kind involved  
them in a loss of £30,000. A bank director  
declared that he had lost a note for that  
amount, and upon his giving an indemnity  
for the sum, in the event of the note ever  
turning up, the money was paid to him.  
Many years after his death an unknown  
person presented the missing note. The  
paper was undeniably good, and the bank  
had no alternative but to cash it, as it  
was payable to bearer on demand, and as



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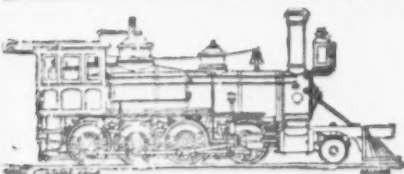
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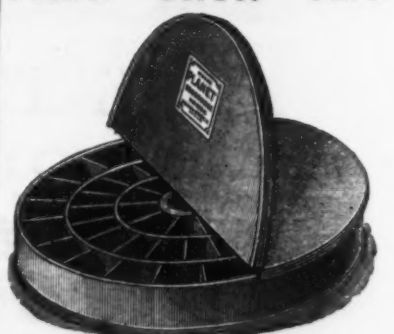
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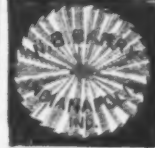
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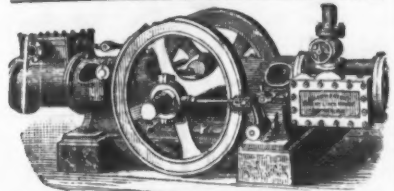
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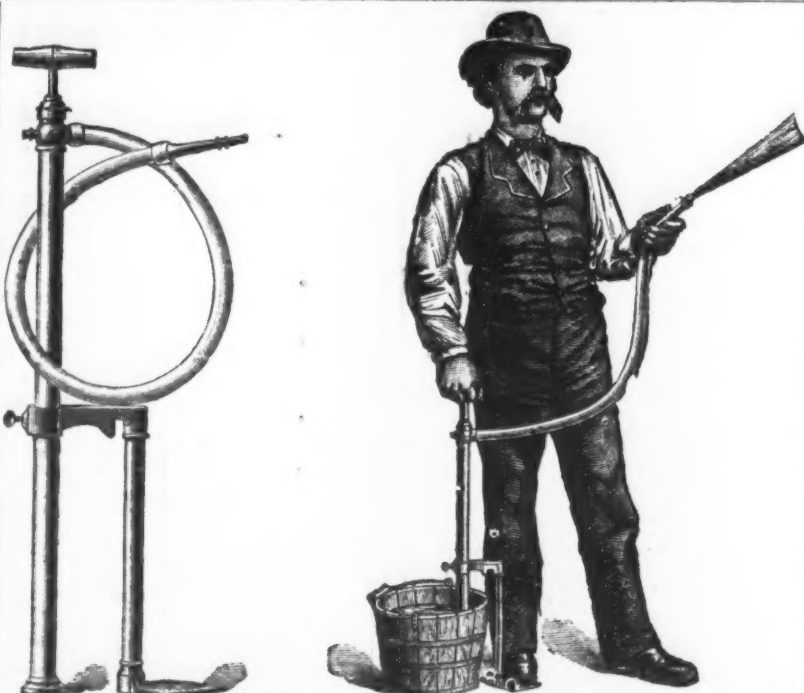
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the heirs of the bank director who had lost  
it repudiated all liability, the money could  
not be recovered. At the end of five years  
the old notes are thrown into a furnace  
specially constructed for the purpose and  
burned. It is a curious fact, however, that  
so firm in texture is the paper of a genuine  
Bank of England note that burning alone  
can hardly destroy it." The bank receives  
interest on the securities deposited for  
notes; but it renders great service to the  
public in various ways. It has the entire  
management of the public debt, conver-  
sions, circulating exchequer bills, payment  
of annuities, &c., and it advances annually  
the amount of the land and malt taxes. It  
is required to give sovereigns in exchange  
for bullion to all comers, receiving a small  
commission. The whole volume of money,  
in reserves and in the hands of the people  
of the Kingdom is estimated at £75,000,000,  
or not more than one-third the volume of  
the circulating medium of the United States.  
Upon this comparatively small volume of  
money is carried on an industry and com-  
merce reaching over all the world, and  
which is at least double that of the United  
States. It is a wonderful development of  
the methods of economizing the use of  
money by banking and the equivalents of  
trade by which the volume of trade of the  
Kingdom has multiplied prodigiously, with-  
out any increase in the volume of money.

### The Industries of New York.

According to the census of 1830, there  
were at that time 513,377 persons pursuing  
gainful occupations in this city. They were  
divided into four classes: Agricultural, pro-  
fessional and personal services, trades and  
transportation, and mechanical and manu-  
facturing. Of the whole number so engaged,  
378,159 were males and 135,218 females.  
Between the ages of 10 and 15 years, inclu-  
sive, there were 10,994 boys and 7471 girls  
employed. The nativity of the persons en-  
gaged in all classes of occupations was in  
part as follows: United States, 240,076;  
Ireland and Great Britain, 135,811, and Ger-  
many, 92,657. Altogether there were 218  
mechanical and manufacturing industries of  
one sort and another, employing a total cap-  
ital of \$181,206,356, and the products of these  
were valued at \$472,926,437. These 218  
industries gave employment to 146,179 males  
over 16 years of age; 71,795 females and  
9875 children and youths under that age.  
The total of wages paid out was \$97,030,021.  
Some facts concerning the leading indus-  
tries are given in the following tables:

Industry.	No. of concerns.	Average No. hands employed.			
		Males above 16 years.	Females above 15 years.	Children and youths.	Total.
Boots and shoes	103	4,136	1,078	181	5,395
Bread and bakery	782	7,141	581	111	7,833
Tobacco	261	6,483	4,575	478	11,536
Clothing	730	30,444	17,727	271	48,442
Carpentering	410	3,438	61	61	3,560
Printing	412	9,015	979	54	10,048
Plumbing	401	1,869	1	115	2,085
Furniture	209	5,531	102	215	5,848
Painting	241	1,794	10	39	1,843
Foundry	267	6,352	31	32	6,415
Jewelry	246	1,602	211	106	1,919
Clothing, women's	230	1,504	1,750	47	3,301
Blacksmithing	202	543	31	31	605
Confectionery	187	1,601	69	115	1,785
Tinware	177	1,449	12	104	1,565
Saddlery	174	580	13	30	623

The whole number of concerns belonging  
to the 218 industries was 11,330, and the  
value of the materials used was \$233,441,691.  
Other facts concerning the leading industries  
were as follows:

Products.	Materials.	Wages paid.	Capital.	Industry.
\$7,663,000	\$3,081,822	\$4,474,099	\$1,895,669	Boots and shoes
6,415,424	1,492,723	1,492,723	5,836,826	Bread and bakery
11,536,408	4,039,340	1,404,805	22,926,821	Tobacco
48,442,000	12,554,265	2,242,065	1,774,322	Clothing
3,560,000	7,519,559	5,876,808	1,404,805	Carpentering
10,048,000	11,608,800	1,168,800	1,168,800	Printing
2,085,000	1,869,000	1,869,000	1,869,000	Plumbing
5,848,000	6,213,976	1,590,210	8,113,234	Furniture
1,843,000	2,613,976	3,865,011	2,613,976	Painting
6,415,000	11,745,875	3,865,011	4,832,715	Foundry
1,919,000	1,919,000	3,865,011	1,919,000	Jewelry
3,301,000	1,750,000	3,865,011	1,750,000	Clothing, women's
605,000	605,000	3,865,011	605,000	Blacksmithing
1,785,000	1,785,000	3,865,011	1,785,000	Confectionery
1,565,000	1,565,000	3,865,011	1,565,000	Tinware
623,000	623,000	3,865,011	623,000	Saddlery

### Trades for Americans.

Two or three weeks ago, says a writer in  
the *Tribune*, a careful inquiry was instituted  
in Philadelphia, the largest manufacturing  
city in the country, as to the relative num-  
ber of foreigners and native Americans  
engaged in the trades and as skilled handi-  
craftsmen of every kind. The result was  
startling. Foreigners, especially the Ger-  
mans and Scotch-Irishmen, had shouldered  
our own people altogether out of almost  
every such occupation. The American boys  
could be counted on the fingers who were  
learning the trade of weaving in the great  
woolen and carpet manufactories. The  
same story was told in the cotton mills, at  
the stocking looms. Yet the wages paid to  
these skilled workmen are high and steady.  
The Scotchman or North Irishman earns  
from \$18 to \$20 per week in Philadelphia,  
owns his comfortable dwelling, and brings  
up his son to the same trade which his own  
father, most probably, followed in Glasgow  
or Londonderry. The American boy has  
not learned this sure, slow road to comfort  
from his father. There was the same report  
from manufacturers of paper, soap, shoes,  
clothes, furniture, shipbuilders, cutlers—  
every industry, in short, but two. The  
American boy of the class which does not  
enter the professions is not to be found in

the trades, partly because he is barred out  
by the trades union, but more because he  
does not choose to go into them. To this  
general rule, there are, however, two nota-  
ble exceptions—printing and machine shops.  
Each of these trades is crowded with native  
American apprentices. "We turn away,"  
said the superintendent of a great engine  
works, "hundreds of applicants in a year,  
for whom we can find no place."

Now, here is a significant hint of national  
character. We are perpetually told that the  
American lad of the partially educated class  
refuses to learn a trade, and becomes a  
salesman or clerk on a miserable salary,  
from the snobbish, vulgar desire to be con-  
sidered a gentleman. Yet the same young  
fellow in a printing office or machine foundry  
works harder and comes out of his daily  
drudgery more grimy and shabby than any  
other mechanic. It is no ambition for gen-  
tility that moves him in these pursuits. But  
they open to him possible short roads to suc-  
cess; they give his inventive faculties some  
play. It is only one man in a hundred who  
out of the composing or press room becomes  
editor or publisher, or who turns out to be a  
lucky Harrison or Winans in the machine  
shop. But each boy is confident that he will  
be that man. When he "goes into business"  
as salesman at \$3 per week, he knows he  
will some day be an Astor or a Stewart.  
When he goes out to Colorado as a cowboy  
he sees in a vision his own cattle grazing on  
a thousand hills.

Hence he turns his back on the trades in  
which there is no chance for sudden success,  
and by which the plodding German or Irish-  
man, generation after generation, secures a  
steady limited competency. Our lad must  
put on seven-league boots to go to his for-  
tune, or he will not go at all. In a certain  
sense, therefore, there appears to be no rem-  
edy for this present condition of affairs. The  
leopard cannot change his spots nor the  
Ethiopian his skin, and the vivid, inventive,  
sharp-eyed American, fond of earning and  
squandering money in bulk, will never be  
brought to plod and save and enjoy life a  
pennyworth at a time, like his European  
neighbor who was not born prospective heir  
to a great estate. A certain grade of our  
skilled trades will always remain, it is prob-  
able, in the hands of foreigners.

But one lesson our American lad must learn  
before he succeeds, and, as he is exception-  
ally sharp, he generally does learn it when  
he finds he does not succeed without it.  
That is, steadiness of aim. Instability is  
our national defect. The American of  
24 who has made up his mind as to his  
business, his politics and his religion, and  
who abides by them for the next ten years,  
is a marked and weighty man. Take the  
crowd of fortune-seekers pouring now into  
Colorado or Dakota, and you will find each  
of them has tried two or twenty methods of  
earning a living before he fell back, like  
Anteus, on the bosom of Mother Earth to  
gather strength. Two or three names in  
each profession, in trade and invention  
would complete the list of living Americans  
who have made a great and signal success,  
and they are invariably men of inflexible  
singleness of purpose. The American lad,  
educated or half educated, is too apt to  
scatter his shot and hit nothing. He would  
be suddenly rich, he would be known as a  
politician, he would be a man of society.  
Hence, with a heritage of natural abilities  
above mediocrity, with keen perceptions,  
fine tastes and a limitless estate waiting for  
him to claim, he fails. It is a story as old as  
the world. "Reuben," said the peer, thou-  
sands of years ago, "is the first-born; the  
excellency of dignity and the excellency of  
power. Unstable as water, he shall not  
excel."

### Postal Cards.

The postal cards of the United States Gov-  
ernment are turned out near the village of  
Castleton, on the eastern bank of the Hudson  
River, about eight miles below Albany. The  
postal-card factory proper, there being sev-  
eral buildings devoted to the purpose in ques-  
tion, is a one-story brick building of very  
unpretending appearance. The cardboard  
is received from the paper mill in sheets 21  
inches by 30—a size just large enough to cut  
up into 40 postal cards. The sheets are first  
printed on an ordinarily large cylinder  
"job" printing press. The impression is  
taken on a plate containing 40 card faces  
with stamp, the monogram US, the scroll and  
words "postal card," and the line, "Nothing  
but the address can be placed on this  
side." Thus, when a sheet of cardboard  
is run through the press it comes out with 40  
postal cards completely printed, ready to be  
cut up into the one-cent missives with which  
the public is familiar. There are three  
presses, any two of which, it is thought, are  
sufficient to supply the demand without being  
rushed.

From the presses the printed sheets are  
taken to the cutting machine, where they  
are rapidly cut into strips containing 10  
cards each. They are fed between rollers  
on which there are four circular blades.  
The cutting into strips is done as fast as a  
tolerably active boy can pass in the sheets.  
From the first cutting-machine the sheets are  
taken to a second cutter, where they are fed  
through rollers with circular blades, set as  
far apart as the width of a postal card.  
Thus 10 cards are produced ready for use  
from every strip that is run through the  
cutter, and the cards then drop into 10  
pockets made of tin, mounted on a shaft.  
The boy who feeds the strips into the cutter  
passes 25 through and then calls out "tally."  
Three girls remove the cards from the tin  
pockets, pack them in stacks of 25 each, and  
provide each package with the proper band  
so familiar to those who buy cards in quan-  
tities of 25 and upward. In addition to  
these operations, one of the three girls has to  
turn the pocket-shaft every time the feeder  
calls "tally," and another has to count the  
cards in any one pocket, so as to see that the  
count of the boy who feeds in the strips is  
correct. Every 25 strips produces 250 cards,  
delivered equally in 10 packets. If any one  
of them contains 25 cards, each of the other  
nine must contain a like number. The yel-  
low-paper band that is wrapped about each  
package of the 25 cards is already gummed,  
so that the three pocket-tenders are able to  
work rapidly. The packages of 25 each are  
placed in piles of 10 each, and each two of



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**FILE MFG. CO.,**  
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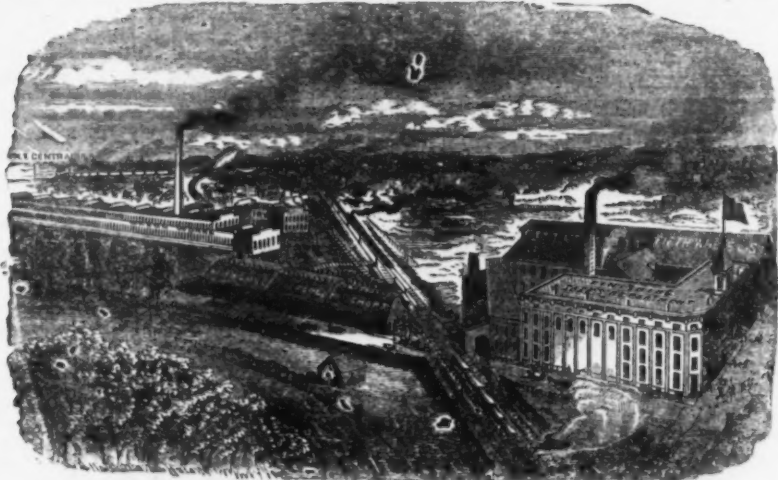
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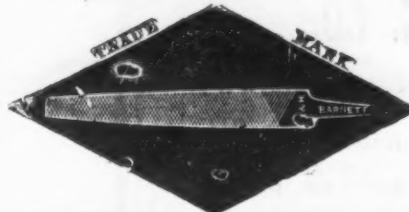
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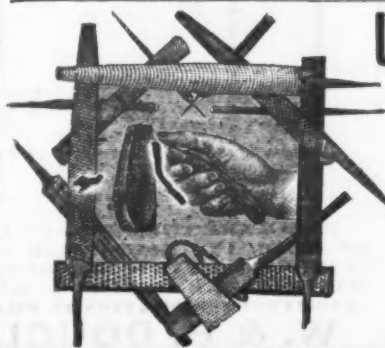
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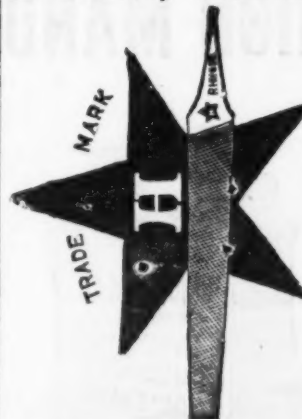
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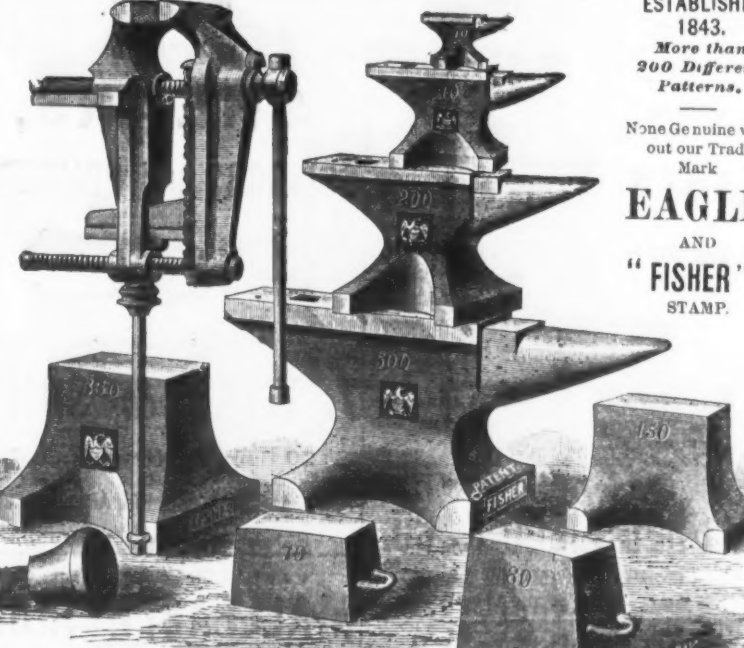


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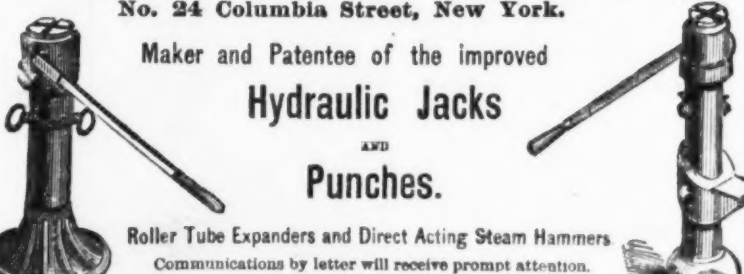
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**English and American Edge Tools.**

The Wolverhampton correspondent of the *Ironmonger*, in a recent communication to that paper, gives the following information on the above subject, which will be read with interest by American edge-tool manufacturers:

"With the view of ascertaining the advances which have of late been made, both as to quality and design, in cultivating and edge tools of Wolverhampton manufacture, I have this week carefully inspected certain of the leading products at some of the principal works, and have compared them with similar articles produced a few years ago. The comparison was most striking, and the progress that has been made reflects the utmost credit upon the Wolverhampton firms. The superiority is marked alike in quality, in style and in finish. This has been brought about mainly by the adoption of machinery instead of manual labor, and by the increased employment of steel, in both of which particulars important strides have of late been made. The machinery has proved especially valuable in greatly improving the eyes of hoes, picks, axes, adzes, hatchets, hammers and other tools. The eyes are now at once deep, smooth and light, and yet perfectly strong and well tapered. As they are punched, all the eyes in a given class of tool are exact counterparts, so that no shaving of handles is required when fitting them on, while, by reason of the depth and slope of the eyes, the handles fit tight. In hoes and picks, but especially in the multifarious patterns of the former, intended for the wide Brazilian market, some of the cheeks are very high, makers priding themselves upon the great additional strength thus imparted. Instead of, as under the system of manual labor, the tools being made out of two or more pieces of iron and steel welded together, many of them are now made of one solid piece of metal—either all steel or wrought iron with steel let into the cutting parts.

In no tools does this improvement appear more conspicuously than in the Brazilian hoes, some of which, of the round-shouldered pattern, I found were being turned out at Messrs. Edwards' works of the large dimensions of 11 by 13 inches, formed of one solid piece of steel. These hoes have bayonet, square or round ribs, as desired, and their finish is such that they will reflect like a mirror. Messrs. Edwards' "Royal Express" hoe, which has for several years past been an especial favorite with some of the principal re-plantation companies of India, and which is manufactured out of the firm's patent all-steel mixture, is particularly noteworthy, on account of the strong throat supporting the eye—an improvement which the firm claim is superior to anything yet introduced. This firm also claim to be the original makers of the Anglo-American pick, which they label as made of best steel. It is a splendid tool, having solid cast-steel ends of 7 inches, and will stand the test of being driven into granite without flinching. It is in large demand for road-making, from Australia and the Cape in particular, and the eye is a decided improvement upon the ordinary socket-eye, since it has a cheek of some 3 1/4 to 3 1/2 inches in height, and, being perfectly smooth, fits exactly the American hickory handle. This tool is also made entirely of steel. Axes and adzes, labeled "solid cast steel," the former made in imitation of American patterns, I saw at the Griffin Works struck on a bar of iron without at all turning their edge—an experiment which speaks for itself as to the quality of the goods. Some of the broad Brazilian axes were steeled up 3 1/2 inches, and the American pattern felling-axe, made, as were the adzes, out of one solid piece, was in every respect a first-class tool. The perfectly waisted or beveled edge of the adzes was striking. At their new Griffin Works Messrs. Edwards are turning out all-steel spades and shovels, for the South American and other markets, which evidence great improvement over former patterns, the strength and exact suitability of design for the work intended being very satisfactory. In a word, there would seem to be no edge-tool firm who are studying the requirements of the times more than Messrs. Edwards. Not a month passes which does not find them bringing out some new improvements.

Respecting the quality of most of the tools which I have particularized, they claim that "they cannot be better," and the firm have in their favor the experience gained by two of the partners and the general manager from lengthened tours in the United States. Much progress I also found had taken place in the tools that are now being turned out by machinery at the works of the Eagle Edge Tool Co., whose new goods display many of the general features of advance referred to at the beginning of my report. Hoes, picks, axes and adzes are being turned out on the American principle, and the company have received from the London representatives of two or three leading Colonial importers most encouraging reports of the favor with which the goods have been received in some parts of Australia and South Africa in particular. In Australia their axes and picks are beginning to sell against American products, and the company believe that they have now obtained the best opening for this class of work that they have had for years past. The same remarks apply in some degree to the Cape trade, whence regular orders for the superior-quality tools are arriving. It would seem, too, that some of the London merchants are awaking to the advisability of sending out better goods. A large Kimberley house in London sent only a week or two ago that it was their intention to discourage the trade in the common class of tools, and to send out only the superior articles, and they expressed their willingness to pay the increased prices which, for the all-steel tools, are of course demanded. In their solid Brazilian hoes the company are very successful in turning out a light, smooth eye, with good cheeks, even in a small-sized article,

and so well have these tools been received that in one recent instance a sample five-cask order was quickly followed by an order for 100 casks. Their Indian taper-bent "Mamootie" solid-eye hoe has an eye twice the depth which it formerly possessed when made by hand. The firm, moreover, have just made for Australia hatchets in imitation of the American Collins hatchet.

At the Eagle Works also I found a splendid collection of axes and hatchets of several descriptions, and of men's and boys' sizes, which had just arrived direct from the States as samples, which the company intend to imitate as nearly as possible, alike as to quality, design and finish, and the success which has already attended their efforts in this direction gives them every confidence in the future. The improvements which John Perks & Sons have of late made in their tools appear chiefly in their all-steel highly-polished hoes for Rio; in the large quantity and better quality of the steel put into their adzes for the Havana market, and in the character of their heavy felling-axes, which are going to Bombay in particular in increasing quantities. The firm are accustomed to supply similar axes to our home government. The hoes and other tools which the Chillington Iron Co. are sending away to South America and other markets likewise show various improvements over those formerly produced.

**Production of Coal in Great Britain.**

Dwelling upon the dissatisfaction now so prevalent among British coal miners and a movement in favor of a limitation of the output, the *London Mining Journal* submits the following, which will be found to explain, to some extent, the origin of the present difficulties:

From returns just received it appears that the quantity of coal raised in 1882 was 156,500,000 tons, being an increase of 2,313,000 tons over the previous year. So far as household consumption is concerned, it is evident that advantage has been taken of every improvement calculated to minimize the quantity used for ordinary purposes, while so far as regards the expenditure of fuel for the smelting of metallic ores, the lowest point has not yet been reached, but greater efforts will now be made in that direction by the attempts being made by the miners to advance the price of coal. From the same cause also we may expect that in re-usable systems of working coal will be adopted, for it is admitted that, notwithstanding considerable improvements in the general system of coal mining, and the utilizing of slack and dust for coke-making and other purposes, yet a good deal of the material is wasted by bad working and carelessness. There does not appear any reason why, by the various modes of working coal, there should be a loss of from 10 to 15 per cent., as is the case, for pillars are left standing that should be carried away, and extensive barriers are left against the influx of water, owing to the want of reliable plans by which the exact boundaries could be determined. But we have the fact of a marked diminution in the increase during last year, and it is by no means improbable that this will continue to be the case for some years to come, until the output becomes stationary for a time, to be followed by a gradual decrease in the drain upon our reservoirs of fuel.

The miners are now doing all they can to bring this about earlier than would otherwise be the case, and they will, of course, be the sufferers in the long run, for they are not guided by the light of past experience. They complain that there is an excess of production over consumption, and that the latter must be diminished to a marked extent for their benefit. No doubt there are now more coal mines than are actually needed to meet our home and foreign requirements, but for this state of things the miners have only themselves to blame. A few years ago, when the productive power of the country was not equal to the demand, they decreased the output while enjoying exceptionally high wages, and so caused the opening out of new coal mines in nearly all parts of the kingdom, and they now complain of the result brought about by their own conduct. Indeed, they are now attempting to initiate the same policy which has been so injurious to themselves as well as their employers. That this has been the case we need only draw attention to the quantity of coal raised per man during the last 10 or 12 years to bear out the remarks we have made. The following figures show the quantity of coal raised yearly, the number of persons employed in and about the mines under the Coal Mines act, the output per man, and the price of the best coal over the ships' side in the Thames:

Tons raised.	Number employed.	Tons per man.	Price per ton.
1870... 107,447,557	345,446	314	17s. 5d.
1871... 117,357,000	370,881	316	18 s
1872... 124,497,100	418,088	298	21 10
1873... 127,006,700	518,109	245	24 10
1874... 125,679,000	538,829	233	24 8
1875... 131,807,100	531,845	248	24 9
1876... 133,344,800	514,522	259	20 s
1877... 134,610,700	494,991	272	24 5
1878... 137,610,200	475,399	279	15 10
1879... 143,608,000	476,810	299	15 11
1880... 140,969,000	484,933	303	14 11
1881... 154,184,100	495,477	311	15 3
1882... 156,500,000	515,000	318	15 6*

From the above will be seen the years of highest prices and the rate of advance or decline. In 1870, when the price of coal was low and the miners' wages were in a similar state, there was toward the close of it a movement of a favorable character, and this increased to some extent in the following year. In 1872 wages and prices went up together, and it will be seen that the result was a considerable decrease in the output per man from 316 tons in 1871 to 291 tons. Notwithstanding the fact that, owing to the high wages paid to miners, many men from other businesses went into the mines, the number having increased from 418,088 in 1872 to 512,109 in 1873, yet with this marked addition to the number of men employed in and about the mines the individual output decreased from 291 tons to 248 tons. Now, had the men in 1873 raised as much per man as was the case in 1872, they would have got 4,046,773 tons more than they did. But the high wages led the men to work only four or five days a week, and so long as the output was kept down, so long were high wages and profits maintained. But a day of working



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1845.

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1855.

D. S. & K.  
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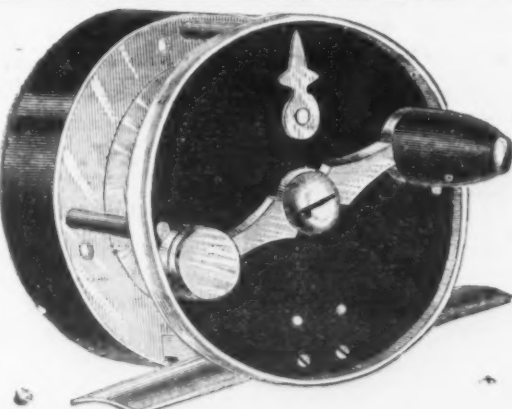
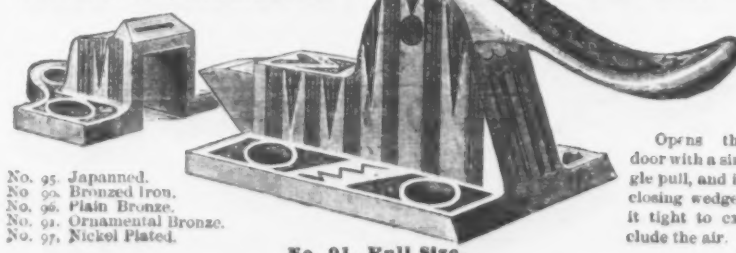
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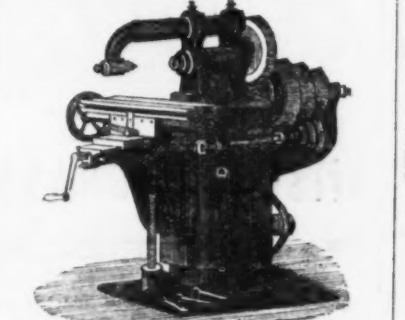
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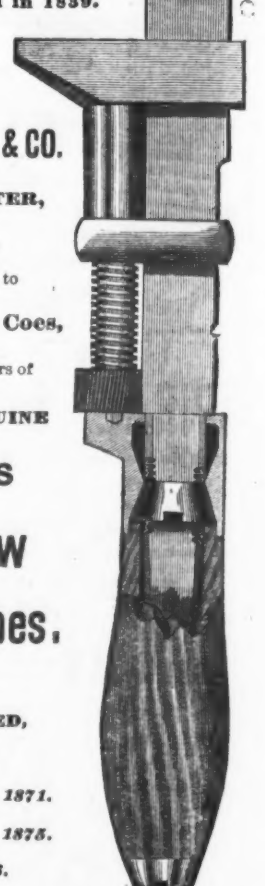
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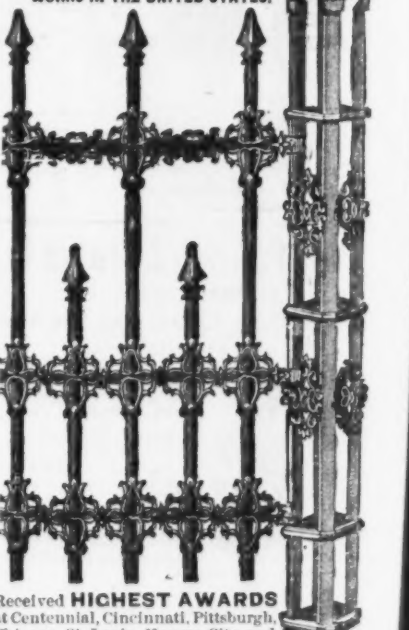
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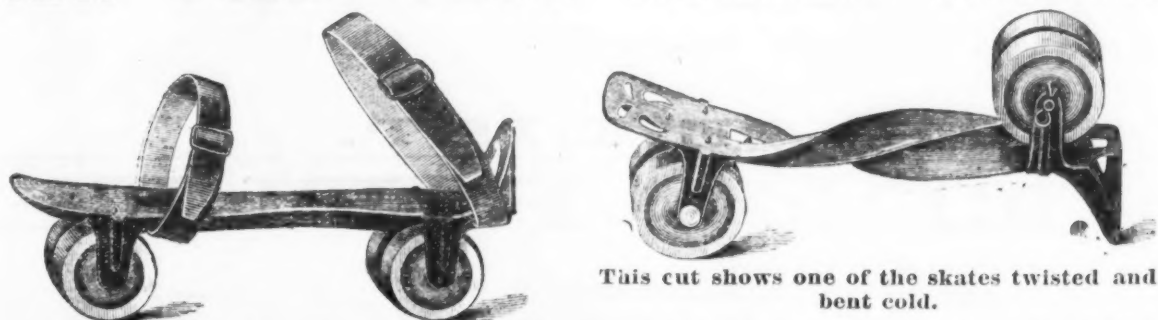
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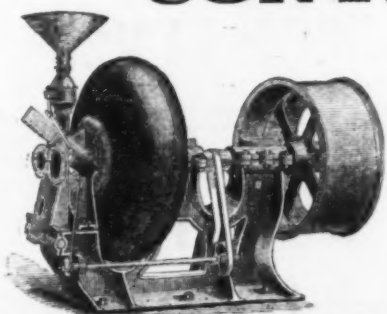
The lightest, easiest working and most durable Roller Skate ever made. The frames are made from a fine quality of decarbonized steel, and cannot possibly be broken in using. The heel support is preferable to the ordinary one of leather, as it cannot wear through. Besides these, the skate has many other advantages, and the price is low as compared with others. Patented June 21, 1881.

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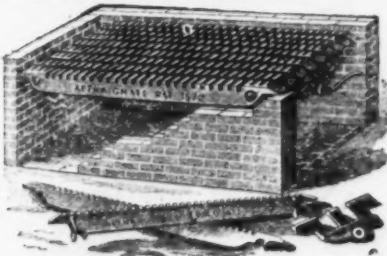
For reducing to an impalpable powder all kinds of hard and brittle substances, such as QUARTZ, EMERY, CORUNDUM, GOLD AND SILVER ORES, BARYTES, COAL, OCHRE, MANGANESE, IRON ORES.

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It is simple and not liable to get out of order. Revolving Shell being constructed of Siemens-Martin steel, and all parts mechanical in design and of first-class construction. Weight, 5,500 lbs. heaviest piece, 1,500 lbs. It will pulverize 7 to 10 TONS IN 10 HOURS with 30 H. P.

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was fast approaching, induced by the high rates charged for coal and the limitation of the output on the part of the miners. Companies were formed and some millions of capital were invested for the purpose of purchasing old collieries and opening out new ones, so that in the course of a very few years there was more coal produced than was required. In fact, the productive power of the country has increased too rapidly, owing to the peculiar state of things which prevailed in 1872 and 1873, and for this no persons are more to blame than the miners themselves, for it will be seen by a reference to the figures we have given that they worked more or less according to the wages they received, and these were, in a great measure, regulated by the price of coal itself. As an illustration of this, if the year 1873 is taken, it will be found 512,199 persons raised 127,016,700 tons of coal, while in 1882 it only required 501,000 workmen to get 156,500,000 tons. This shows plainly the effect that wages have upon the individual production, and it need scarcely be said that if the miners had worked anything like as hard in 1873 as they did in 1882, they would now be in a very different position to what they are, for there would be a considerably less number of coal mines than there are, and as the productive power would not be in excess of the consumption, the profits and wages of mine owners and miners would be very different indeed to what they are, and there would be no necessity for attempting to reduce the output of coal by artificial means.

### The New Steamer Fulda.

The steamer Fulda, the third fast steamer of the North German Lloyd fleet, arrived here on her first trip on March 23. She was built on the Clyde in the shipyard of Messrs. John Elder & Co. The Fulda is the sister ship of the Werder. Her length is 455 feet; breadth of beam, 46 feet; depth of hold, 36.5 feet; gross tonnage, 5150 tons, builders' measurement. She is propelled by compound engines of the three-cylinder type, which have two low-pressure cylinders 86 inches in diameter, and one high-pressure cylinder of 62 inches diameter. The stroke is 5 feet. The engines have developed 6000 horse-power, 600 more than stipulated by the terms of the contract. In a full-speed run 17 knots per hour can be made. The steamer has ample accommodations for 1100 steerage, 150 second-class and 170 first-class passengers. The steerage passengers are berthed on the lower deck, and their quarters combine many arrangements for light, ventilation and comfort not found in other transatlantic passenger steamers. The men's and women's compartments are kept strictly distinct, and private cabins are provided for families. The second cabin is located at the after end of the vessel. The staterooms for the first-class passengers are situated before and aft of the saloon, and are fitted up with every accommodation and convenience that experience could suggest. The ventilation is unusually good, the atmosphere being excellent in all parts of the ship. The chief dining saloon is a very handsome and comfortable apartment 50 feet long and 45 feet wide, and is lighted by a cupola from the promenade deck. As regards equipments, the vessel is complete, being provided with 280 electric lamps, electric bells, bathing-rooms, steam windlasses, steam and hand steering gear, steam pumps, fresh-water condensers and all the recent appliances for insuring safety to the vessel and comfort to those on board. All in all, the Fulda is decidedly one of the finest ocean steamers ever seen in this port.

### Archaeological Discoveries in Mexico.

Important archaeological discoveries have recently been made at Mitla, a village in Mexico, which is situated between 20 and 30 miles from Oajaca, in the table-land of Mixtecapan. Extensive remains of ancient palaces and tombs have been revealed, and they are exceptionally remarkable from the columns supporting the roof, a style of architecture peculiar to the district of Mexico in which they are to be found. These ruins have been explored by Herr Emil Herbruger, although he was not permitted to excavate the sites. In a description of the ruins Herr Herbruger states that the great hall contains six columns and is about 121 feet long by 23 feet broad. Each column is about 11½ feet in height, and is of solid stone. The hall, which is entered by three doorways, was used as an ante-chamber for the Royal Guards. The tombs are all of equal size and T-shaped. The walls are embellished with stone mosaics.

The new steamship Tremont, built by John Englis & Son for the Portland Steam Packet Company, now lies at the pier foot of East Thirtieth street, East River, where she is receiving her finishing touches. When completed the Tremont will be elegantly furnished. The Messrs. N. F. Palmer, Jr. & Co., are attending to the machinery. The Quintard Iron Works will furnish the Tremont with a vertical beam engine, 56 inches diameter of cylinder, 11 feet stroke of piston, to be operated by Sickel's cut-off of the most approved pattern. The engine will be handsomely polished and nickel-plated. She will be supplied with Lightball's surface condenser and patent tubes and packing. She will have one marine tubular boiler, 16½ feet wide, 14 feet high and 18½ feet long, to be braced for carrying 45 pounds steam pressure. She will have Mahoney's patent wheels, 33 feet diameter over buckets, 7½ feet face. The engine-room will be on the saloon deck. Her speed will average 18 miles an hour. Mr. A. A. Wilson, of the Quintard Iron Works, designed the entire machinery.

Train No. 19, on the Pennsylvania Railroad, leaves Jersey City at eight minutes after four every afternoon, except Sunday, and arrives at the Broad street station, Philadelphia, at 6 o'clock, which makes the schedule time 1 hour and 52 minutes. The train does not stop until Trenton is reached, a stretch of 57 miles. Here four minutes are lost. The next stop is Germantown Junction, where three minutes more are lost from the schedule time. Finally, Powl-

town avenue causes a delay of two minutes more, making, in all, a loss of nine minutes, which leaves the engineer but 1 hour and 43 minutes to make the run of 92 miles. This train beats the running time of the newspaper train—which is 1 hour and 45 minutes—by five minutes, making train No. 19 the fastest on the Pennsylvania Railroad.

### The Coke Industry.

Mr. Joseph D. Weeks, special agent of the Census Bureau, recently completed and filed with the proper authorities his report of the coke industry. The following is a brief summary, the original report giving the States in detail, dividing them into counties where manufacturing exists:

There are 149 coke establishments in the United States, representing a capital of \$5,545,058. The industry gives employment to 3142 people, 3063 of whom are males above 16 years of age; 3 females above 15 years and 71 children and youths. The total amount of wages paid during 1880 was \$1,198,654. During this year 4,360,110 tons of coal were used, costing \$2,761,057. The value of other material used was \$233,784; total value, \$2,995,441. Total amount of coke produced during the year, 2,752,475 tons, valued at \$5,359,489. The coke establishments are distributed in ten States, as follows: Alabama, 4; Colorado, 1; Georgia, 1; Illinois, 4; Indiana, 2; Ohio, 15; Pennsylvania, 104; Tennessee, 4; Virginia, 2; West Virginia, 12.

The four establishments in Alabama represent a capital of \$135,500; number of hands employed, males above 16 years, 64; paid in wages in 1880, \$38,500; materials, coal, 67,376 tons, valued at \$75,314; value of other materials, \$1304; total value, \$76,618; total amount of coke produced during the year, 42,035 tons, valued at \$148,026.

Colorado's one establishment has a capital of \$150,000 and employs 75 hands, all males above 16 years; wages paid in 1880, \$13,500; materials, 29,500 tons of coal, valued at \$29,500; value of other materials, \$600; total value, \$30,100; total amount of coke produced during the year, 18,000 tons, valued at \$90,000.

The one establishment in Georgia has a capital of \$80,000, and employs 107 hands, all males above 16 years; wages paid in 1880, \$13,837; materials, 117,000 tons of coal, valued at \$120,000; value of other material, \$1900; total value, \$124,900; total amount of coke produced, 70,000 tons, valued at \$140,000.

The four establishments in Illinois represent a capital of \$205,000; hands employed 18, and all above 16 years excepting 2 children; wages paid in 1880, \$9347; materials, 15,000 tons of coal, valued at \$15,000; value of other materials, \$420; total value, \$15,420; total amount of coke produced during the year, 7000 tons, valued at \$24,700.

Indiana's two establishments represent a capital of \$8000; hands employed, 4, all over 16 years of age, all males; wages paid in 1880, \$300; material, 1500 tons of coal, valued at \$2025; value of other materials, \$200; total value, \$2225; total amount of coke produced, 1000 tons, valued at \$3000.

Ohio's 15 establishments represent a capital of \$144,012, and employ 753 hands, 150 males above 16 years and 3 youths; wages paid in 1880, \$51,977; materials, 103,843 tons of coal, valued at \$225,432; value of other materials, \$5399; total value, \$233,831; total amount of coke produced, 109,296 tons, valued at \$334,546.

Pennsylvania leads them all. Her 104 establishments represent a capital of \$1,262,525, and employ 2444 hands, 2379 of whom are males above 16 years, 3 females above 15 years, and 62 children and youths; wages paid in 1880, \$953,431; materials, 3,608,095 tons, valued at \$2,031,305; value of other materials, \$209,849; total value, \$2,241,154; total amount of coke produced during the year, 2,317,149 tons, valued at \$4,190,136.

The four establishments in Tennessee represent a capital of \$200,021, and employ 114 hands, all males above 16 years; wages paid in 1880, \$38,820; materials, 179,311 tons of coal, valued at \$124,137; value of other materials, \$8092; total value, \$132,929; total amount of coke produced, 91,675 tons, valued at \$212,493.

The two establishments in Virginia, representing a capital of \$30,000, were not operated during 1880. The 12 establishments in West Virginia represent a capital of \$330,000 and employ 163 hands, 154 males above 16 years and 4 youths; wages paid in 1880, \$48,932; materials, 148,480 tons of coal, valued at \$135,044; value of other materials, \$3020; total value, \$138,954; total amount of coke produced, 95,720 tons, valued at \$216,588.

**Horse-Power of Boilers.**—The term horse-power, referring to a boiler, has no definite meaning. In the early days of the steam engine, when there was little difference in the details of engines and boiler, it usually happened that a boiler large enough to furnish one engine with steam would answer for any other of the same size. As the power of the early engines was in direct proportion to their size, any boiler of certain dimensions would furnish steam for an engine developing a definite horse-power, and hence was said to be a boiler of a certain horse-power. As improvements, however, were introduced and various forms of boilers and engines were adopted, it was found that the size of the boiler was not always a measure of its efficiency, and that different engines required very different quantities of steam to develop a given horse-power. Thus it frequently happens that what is a 10-horse-power boiler for one engine, or a boiler that furnishes steam to develop 10 horse-power in that engine, may be only a 5-horse-power boiler for a more wasteful engine. Under these circumstances it is impossible to decide what is the horse-power of a boiler in case of dispute. If, on the contrary, the rating of the boiler is based upon its evaporation under given conditions, a simple experiment will settle whether it is working up to its rating.

**Steam Plowing.**—Accounts reach us of interesting experiments which were recently made near Baltimore, Md., with a powerful



# H. D. SMITH & CO.,

## Plantville, Conn.,

Manufacturers of the

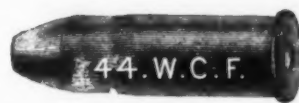
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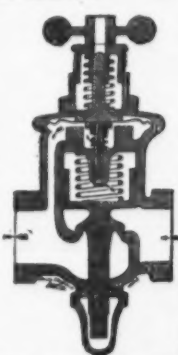
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Sporting Rifle, 24 in., Octagon Barrel, 15 shots, .44 cal.,	\$27.00	Sporting Rifle, 28 in., Octagon Barrel, 11 shots, .45 cal.,	\$31.00
Sporting Rifle, 24 in., Round Barrel, 15 shots, .44 cal.,	25.00	Sporting Rifle, 28 in., Round Barrel, 11 shots, .45 cal.,	29.00
Carbine, 20 in., Round Barrel, 12 shots, .44 cal.,	24.00	Carbine, 22 in., Round Barrel, 8 shots, .45 cal.,	27.00

Double Set Triggers, \$5 extra. Extra Length Barrels, \$1 each inch.

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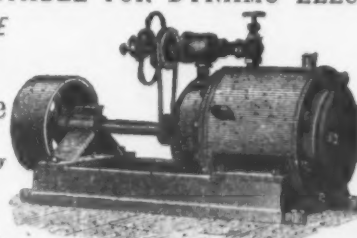
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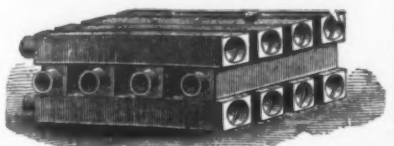
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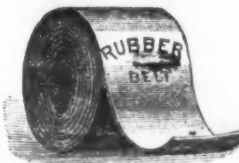
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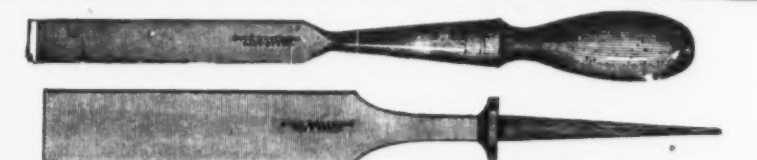


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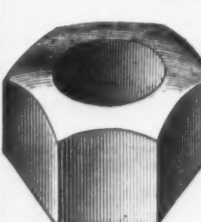
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steam plow, the invention of Mr. B. S. Benson, of that city. From these it appears that each plow cuts a furrow 20 inches wide and from 8 to 9 inches deep. Several plows may be combined and drawn by a single traction engine, an interesting feature of which is a track which the engine puts down and takes up as it moves forward. At one of the recent trials above mentioned, the engine was attached to the plows, and moved at the rate of 2 1/2 miles per hour, leaving in its wake a strip of plowed ground 16 3/4 feet wide. A local paper states that there are no fields in the vicinity of Baltimore large enough for a thorough trial of the plow, which is intended for the large Western districts, and especially for the Red River region in the Northwest.

### Belt Clamp.

A simple belt clamp or tightener has recently been perfected and patented by Mr. Alfred Box, of the Northern Liberty Works, Philadelphia, some idea of which can be obtained by inspection of Figs. 1 and 2 of the accompanying engravings. The device has been designed to take the place of the old and slow process of screwing wooden clamps to belts, requiring adjustment and taking up with side screws. This plan, although in very common use, consumes time and is no small item in the expense of conducting a manufacturing establishment. It frequently results in the stoppage of the entire machinery in a shop, and the consequent idleness of all the workmen employed, for a considerable period. Many attempts have been made to produce a light, useful tool which would facilitate work of this kind, but those that have been produced have been expensive to manufacture, compared with the old screw arrangement, which has been instrumental in keeping them out of general use. The new device seems to possess many very decided advantages, the principal feature to which the patentee directs attention being its cheap cost to manufacture. The parts are cast in such a way that one piece locks the other in place, saving all necessity of screws, and consequent machine-work and drilling in manufacture.

Fig. 1 shows the device open, ready to receive a belt to be operated upon, while Fig. 2 shows it with the belt ends in place, the manner of using the device being clearly indicated by the illustrations. In the published description of this belt clamp Mr. Box directs attention to the advantages of using belts tightly drawn, especially in modern practice, in connection with high-speed engines, electrical machines, fast-running wood-working machinery, &c, and also to the advantage of rivets over hooks or laces, and calls attention to the advantages of a simple clamp of this kind for bringing the ends of the belts into proper relationship in order to rivet them, and also in drawing belts tight and permitting the slack to be taken up in the case of fast-running machinery above alluded to.

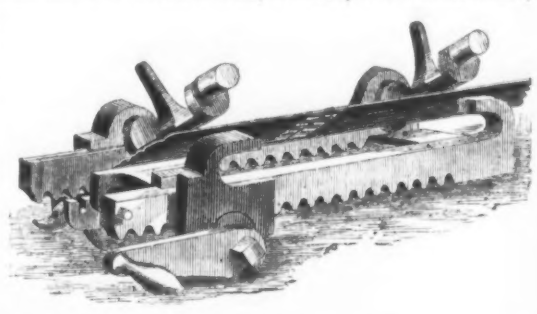
**Mineral Wealth of Tennessee.**—Henry E. Colton, State Geologist of Tennessee, in his report to the Commissioner of Agriculture, Statistics and Mines of the State of Tennessee, states that the survey of the Western iron belt has demonstrated the existence of many valuable beds of ore heretofore entirely unsuspected, and that the amount of ore in that region is actually beyond the most sanguine estimates ever made. In the past this region was the seat of an extended manufacture of iron, but it was not large in the sum total. In the year 1855 there were 35 furnaces, producing about 40,000 tons of metal. At the present time there are only 5 in blast, and they produce about as much metal as the 35 did in 1855. As a seat for the manufacture of charcoal iron this region offers inducements to the capitalist. The ore is rich in iron, and free from large quantities of the matters deleterious to the manufacture of good metal. It is easily and cheaply mined; the supply is as inexhaustible as anything mundane. Limestone is usually in immediate connection with the ore, or near at hand, and there are large areas of wooded land valuable for farming purposes, while experience has proven that this timber, when cut off, will renew itself, ready to cut again in at most 30 years. For 75 years the manufacture of pig iron with charcoal has been an established industry of the State, but only within the last 12 years has its manufacture with mineral fuel been persistently tried. With this increase of the mining and iron manufacturing industry has come also a large increase in the value of the mineral lands. Properties which two years ago could have been bought for \$1 or less per acre, have sold for \$10, \$15 and \$20 per acre. Thriving villages have sprung up where a few years ago were wild, untouched woods, and the farmers have been able to obtain good prices for their products at their homes.

**Petroleum Fuel.**—The Boston Commercial Bulletin states that the Norway Iron Works, at South Boston, believe they have succeeded in so simplifying and cheapening the process of using petroleum that it is preferable to the usual system of heating with gaseous or solid fuel. The petroleum is forced into a cast-iron tank, which contains a receptacle to which a large surface has been given by alternate contraction and swelling of the section by deep corrugation. Upon the surface of this interior receptacle the petroleum drops in a small stream. Through the interior of the corrugated receptacle passes live steam, which issues from an orifice in the bottom, in a superheated condition, mixing with the vaporized oil. The entire cylindrical tank is heated by a

special fireplace, and the mixture of superheated steam and vaporized petroleum is directly carried to the furnaces where it is used.

### Steam Boiler Explosions.

The Locomotive, in considering the boiler explosions during the year 1882, says that the number of these accidents is much larger than it should be, though when compared with the number of boilers in use in the country the percentage is small, being only .11 of 1 per cent. of the whole. When careful and intelligent investigation is made into the cause of many of these explosions it is found that the boilers have been worn out, overworked, or there has been some carelessness in construction, setting or management. The tendency among steam-users to hold on to old boilers and get a little more work out of them is altogether too strong, and a further tendency to add a little more pressure, when work is brisk, to already overworked boilers,



Belt Clamp.—Fig. 1.—General View of Clamp Open for Receiving the Belt.

has no doubt been the direct cause of many accidents. There is a demand for more steam—more steam—while the boiler capacity is not increased. Incompetent men are often employed to take care of boilers—men who are habitual drunkards, and utterly incompetent to have such responsible duties in charge. The desire to reduce expense leads to the employment of very inefficient and cheap help, and so long as this is done boilers will explode. Explosions are not confined to any special type of boiler. Wrought-iron, cast-iron, horizontal, upright and sectional boilers all have their troubles. No boiler can ever be regarded as safe under poor and inefficient management, while any well-constructed boiler of proper

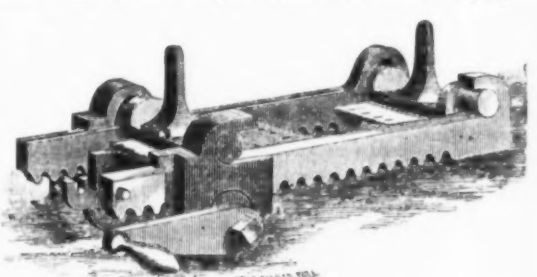


Fig. 2.—The Clamp Holding the Two Ends of a Belt Ready for Fastening.

type, well set and under good management, may be regarded as safe. The best of men will sometimes be careless, or from thoughtlessness neglect some important duty; hence perfection cannot be expected in every one of the 75,000 or 100,000, more or less, of engineers and firemen in the country.

The record of defects discovered by the Hartford Steam Boiler Inspection and Insurance Co. during the year tells its own story. It goes to show that boilers are often found in much worse condition than their owners have any conception of, and these timely examinations have saved many establishments from wreck and ruin. This company examined during the past year between 16,000 and 17,000 boilers. They are used in all kinds of manufacturing establishments. Of this number six have exploded, four of which were in ironworks. In two cases leaks were discovered, but before the fires could be drawn and the boilers put out of use, they parted at the girth seams and the different portions were projected in opposite directions. The hard firing which many boilers in ironworks receive, and the carelessness in allowing the currents of cold air to flow into the furnace and along the boiler bottom when the iron is being run off, also the feeding of cold water, are fruitful causes of disaster. The remedy against these accidents is apparent. Have your boilers honestly made, of good material. Don't buy this or that iron or steel because it is cheap; satisfy yourself that it is all that is claimed for it, and that it is properly branded and stamped as to quality. Buy your boilers of a maker whom you know to be honest and intelligent. Have your boilers well set; don't leave the work to any cheap brick-layer, who has no idea whatever of what is required for good draft and a proper distribution of heat along the fire surfaces of the boiler. It will pay in the end to employ competent men for this work. When the boiler or boilers are set, arrange to have them periodically inspected, which, with a sober, competent engineer in charge, will not only secure economy, but the danger of explosion will be reduced to a bare possibility.

The returns of British blast furnaces in and out of blast on March 1 show an increase of 10 in the working total since the previous monthly report. Of 918 furnaces built in the United Kingdom, 556 were working and 362 idle, against 546 working and 372 idle last month, and 575 working and 350 idle on March 1, 1882.

Considerable interest is centered in the experiments and negotiations now in progress in Scotland, with the view of adopting the basic process.

We understand that the Shelby Iron Works, of Alabama, and the Martel Furnace, Michigan, have begun to use the Mathieu retorts.



# The Iron Age

AND  
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New York, Thursday, March 29, 1883.

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## The Labor Situation in the Iron Works.

While there are no very decided movements at present manifest in connection with labor in the iron mills—at least, none that make any very decided commotion on the surface of things—it is evident that there is an undercurrent that may have important relations to the future rates of wages of the iron and steel mills of the country. In a number of iron mills in the East reductions have recently been made in the prices of various classes of work. Boiling in Philadelphia has of course come down, in accordance with the sliding scale in force there, to the rate properly fixed by the present card on iron, which would make boiling, we believe, \$4.30 a ton, but it is evident that the rate will not stay here long, as the selling price of iron is below the rate at which \$4.30 should be the price for boiling. In other parts of the East decided reductions below this rate already have been made. Without entering into the details of these, it may be said that the price of boiling in the East at the present time is from \$3.50 to \$4.30, the latter rate ruling in Philadelphia, and the former at a number of mills in the interior of Pennsylvania and in some parts of New York, New Jersey and New England. These reductions have been made without any serious friction. The men have been convinced that the condition of trade demanded it, and have accepted the situation without trouble.

In the West there has been no change in the price of boiling or the wages of other skilled labor in the iron mills, as, indeed, there could not be under the agreement entered into at the close of the strike, which remains in force until the 1st of June. For some weeks past, however, the various meetings preliminary to the scale convention, which under the rules of the Amalgamated Association meets on Saturday, April 7th, have been held in the West, and though these meetings are generally held to be confidential, enough has leaked out regarding their action to indicate that there is considerable unrest in the ranks of labor in the iron mills over various matters. It is reported, in the first place, that the feeling engendered by the last strike between the forge department and the finishing department is by no means allayed. It is alleged that a number of meetings have been held with a view to reorganizing the United Sons of Vulcan, which was a boiler's organization, and that at a meeting held on last Saturday or Sunday, at or near Pittsburgh, at which 85 delegates, representing seven States, were present, it was decided to reorganize the old association, though the time for doing this and for withdrawing from the Amalgamated was a matter to be determined by future circumstances. Some of the officers of the Amalgamated Association deny this, but they have denied so many things that after events have shown true that something more than their word is needed to disprove this statement.

It is also reported that the finishers, especially the sheet rollers, are agitating for a change of the basis of wages for their class of work. All scales are at present based on a 2½ cent card for bar iron. It is proposed to base the card for rolling plate and sheet iron on some size of plate or sheet iron, the result being an advance of about 15 per cent. It is also stated that the engineers who made a demand last year for a scale will insist on their demand this year. These various matters have been brought up at the different meetings held in connection with the organization of the scale convention. Whether all of these demands or any of them will be adopted by the association remains to be seen. It is believed, however, that the forge department and a large number of those in connection with the finishing department favor adherence to the old scale, and it seems evident that should the finishers succeed in getting the scale convention to demand an increase in the finishing department, it would result in the immediate disruption of the Amalgamated Association. In the meantime, a number of disputes in connection with labor in the West that have been unsettled for some time past, and others that have lately begun, have either been ended or are in a fair way of being closed. The trouble at the Joliet mill has been settled by the workmen yielding to the demands of the manufacturers. It will be remembered that late last year the manufacturers made a demand for 20 per cent. reduction in the steel-rail mills, which, after some discussion and counter offers, was first refused and afterward accepted by the men. But in the meantime the price of rails had gone down so much that the manufacturers demanded 33½ per cent. This was conceded at Joliet last week, and the mill either is now or soon will be in operation.

At the Vulcan, where a similar state of affairs existed, attempts are being made to run the mill non-union. At Springfield, Ill., the manufacture of rails having been abandoned and a merchant-steel mill substituted in its place, the proprietors determined to run non-union. No trouble was experienced for two weeks, when the union men in the other departments struck. The mill is now running single turn non-union, and in a few days will probably run double turn. Strenuous efforts are being made to settle all these differences. It seems evident that there must be a reduction of wages in the iron mills of the West in the near future. The most intelligent men in the Amalgamated Association recognize the necessity of this.

Of course they will put the day off as long as possible, and, if they think it possible to make a successful stand against the reduction, will do so. But it seems almost useless to expect that the manufacturers of Pittsburgh will continue paying the great advance in puddling and other wages over those that are paid in the East.

## Pig Iron and Ore in the West.

While perhaps there has not been what would be called a marked improvement in the pig-iron market in the West within the past few weeks, it certainly is a fact that in some districts of that section the market is considerably firmer and prices have somewhat advanced. This has been due largely to the unsettled state of the ore market and the doubt as to what would really be done about ore for next year's delivery. In view of the fact that at one time it seemed unlikely that the ore producers in their offers would come near meeting the views of the consumers, a great many furnaces had determined to use up what stock they had on hand and then blow out. A number have already done this, and we are of the impression that our April statement of furnaces in and out of blast will show a considerable reduction from the list published for the 1st of January. On some grades of ore, however, the ore men have fixed their price. Republic ore, we believe, is held at \$8 for the furnaces, or at least we have been informed that the Republic Co. have offered ore at \$8 to certain furnaces. This is a reduction of \$2 a ton from the price ruling last year, or a reduction of 20 per cent. It is, however, by no means a reduction proportionate to that in the price of pig iron. There are a number of ores that in their prices bear a certain relation to the Republic. Some command as high a price, but others 25 to 50 cents a ton less. These ores will bear the same relation to the Republic they have heretofore. It is probable, however, that some of the lower-grade ores will not bear the same relative price to these better ores that they have in years past, though what the asking price of these cheaper ores will be we do not know at present.

The ore men assert that the prices named are the lowest that they will take; that they are determined not to work their mines and take the ore out of the ground unless they can get a reasonable profit on it. This by some miners has been fixed at \$1 a ton. It is evident, however, that with the prospect before the pig-iron men, \$8 to \$8.50 a ton for Republic ore, and other ores in proportion, is more than they can afford to pay. The Bessemer men in years past have virtually fixed the price of ore by their readiness to contract early in the season for the ore they needed at almost any price that the producers demanded. This year they have not been so quick. The profits do not promise to be so large, and they cannot afford to pay any asking price. The Western pig-iron men in the past have shown a readiness to accommodate themselves to the circumstances that would indicate that there will not be much of an overproduction. Most of the furnaces that make iron for the general market, unlike many of the furnaces in the East, buy all their materials, or, in a word, only own the furnace-stack and surroundings. The stoppage of work only "lays idle" the capital invested in the furnace plant, and not capital locked up in ore and coal mines, and all the discounts that have to be provided for are those which the furnace business have made necessary. For this and other reasons it has happened that the Western furnaces have shown, by their blowing out, a readier yielding to the condition of affairs than the Eastern furnaces, and it is probable, if the present circumstances continue, that the number of furnaces even now in blast will not long remain as large as it is.

## The Steel Trades of Great Britain in 1882.

The advance sheets of the annual statistical report of the British Iron Trade Association, just received, form an interesting and valuable contribution to the history of British metallurgy. Inspection shows that the total production of Bessemer steel ingots in the entire Kingdom in 1882 was 1,673,649 tons, representing an increase of 231,930 tons, as compared with the production of the previous year. Comparing this increase with that of 1881 on 1880, we find it to be less by 165,407 tons, the latter increase having been the greatest advance made in any one year in the history of the trade. The production of Bessemer steel rails during 1882 amounted to 1,235,785 tons, an increase of 212,045 tons on the production of 1881, against an advance in the latter year of 283,830 tons on the production of 1880. Of the total quantity of ingots produced in 1882, 74 per cent. were manufactured into rails, against 70 per cent. in each of the two years 1881 and 1880. In 1882, therefore, the proportion of rails to ingots was 4 per cent. more than in either of the two preceding years. Detailed statistics of the production of Bessemer steel ingots in each district of the United Kingdom and in each of the two last years show that the largest quantities of ingots were turned out in South Wales and Sheffield.

So far as the number of Bessemer steel works in operation during 1882 is concerned, the report gives it as the same as in the

preceding year—namely, 23, one new establishment having commenced to manufacture steel for the first time in that year, while another company discontinued the manufacture altogether. The number of converters in work during the year was 80, or two less than in 1881, while 24 were idle—this being three less than in 1881—and ten, or four less than in 1881, were in course of construction. The average output per converter increased from 17,582 tons in 1881 to 20,920 tons in 1882, while in 1879 the average yield per converter was only 12,641 tons. While the converters in work have thus averaged 3336 tons per converter more than in 1881, there is a large amount of variation in the yields obtained in the different districts. The best result obtained at individual works was 78,202 tons, with two converters—an average of 39,101 tons per converter, while at another works the average yield per converter amounted to 31,178 tons. The former is believed to be the best record that has yet been made in Great Britain in Bessemer practice.

The total quantity of Bessemer steel plates turned out in 1882 was 33,500 tons, against 21,989 tons in 1881 and 21,500 tons in 1880. Of the 23 works engaged in producing steel of this description, nine turned out in 1882 quantities of plates varying from 10,000 to 14,000 tons. The total quantity of blooms produced was over 130,000 tons.

As to the production of open-hearth steel in 1882, returns obtained from the steel works, and verified by Dr. Siemens, show the production last year to have been 436,000 tons, against a production of 338,000 tons in the preceding year. This figure is an increase of 98,000 tons, or 29 per cent. on the production of 1881, which in its turn was an increase of 87,000 tons, or 34.6 per cent. on the production of 1880. Within the last two years, therefore, the production of open-hearth steel has increased by 185,000 tons, a quantity which is 10,000 tons in excess of the whole production of the country in 1879. The figures for the individual districts show that during 1882 Scotland more than doubled its production of open-hearth steel, this being attributed to the demand on the spot for open-hearth steel plates, of which more than 150,000 tons were produced during the year. The total output of both Bessemer and open-hearth steel in 1882 was 2,109,649 tons, while in 1879 the corresponding production was only 1,009,511 tons. Within four years, therefore, the production of these two descriptions of steel has more than doubled in Great Britain. The number of firms actually engaged in the production of open-hearth steel in the United Kingdom during each of the last three years was 20 firms, 27 firms and 35 firms respectively. At the end of each of the last three years the number of open-hearth furnaces erected was 120, 149 and 163 respectively, and the average annual production of the furnaces actually at work during each of the three years was 2540, 2925 and 3114 tons.

## The Coke Production of the Census Year.

From the "Compendium of the Census," which has just been distributed, we obtain the figures given in another column, showing the statistics of the coke manufacture during the census year, as gathered by the special agent in charge, Mr. Joseph D. Weeks. This is, we believe, the first attempt ever made in this country to gather the statistics of this industry, and the report accompanying the same is the first attempt ever made to bring together the facts regarding coke, or, in other words, it is the first work of any general character ever published on coke. Percy's chapter in his recent work on "Fuel" being the most complete ever before published. In addition to the statistics of coke in this country, Mr. Weeks enters quite fully into the history and technology of coke, not only in this country, but abroad. The question of ovens is discussed at some length, and the subject of the utilization of by-products, which is receiving so much attention abroad, is discussed very fully, and the latest phases of the subject given.

From the figures given it appears that the total product was 2,752,475 tons of coke. As was well known, Pennsylvania is by far the largest producer, producing 84.18 per cent. of the total make; Ohio, which came next, made 3.95 per cent.; West Virginia, 3.48 per cent.; Tennessee, 3.33 per cent.; Georgia, 2.54 per cent.; Alabama, 1.53 per cent.; Colorado, 0.65 per cent.; Illinois, 0.27 per cent., and Indiana, 0.04 per cent. The county producing the largest total was, of course, Fayette County, Pa., in the Connellsville region, followed in order by Westmoreland, Blair and Allegheny, in the same State. The average value of the coke produced was a little over \$1.04 a ton of 2000 pounds, the coke of Pennsylvania being on the average the lowest price, \$1.81, and that of Colorado the highest, \$5. It will, of course, be understood that the price does not indicate the quality of the coke, but the relations of the different coals to supply and demand, the price of a coke really depending, as a rule, upon the price at which Connellsville coke can be laid down in competition with it.

In the manufacture of this coke 4,360,110 tons of coal, valued at \$2,761,657, were used. This would be 1.57 tons of coal, valued at 63.3 cents a ton, to a ton of coke—or the value of the coal in a ton of coke would be \$1.00½. The yield of the coal in coke was 63.1 per cent. The yield in Pennsylvania was 62.4 per cent., in Ohio 56.4, and in West

Virginia 64.4. The total number of employees was 3142, to whom \$1,108,654 was paid. This would make the wages paid to a ton of coke 43½ cents. This does not include the wages paid in moving the coal, but only those paid from the delivery of the coal at the oven until it is loaded upon the cars. There were 76,176 ovens built at the close of the census year, and 2085 building, making a total of 12,261 built and building.

## Thirty Years of Progress.

The recent issue of the "Compendium of the Tenth Census" calls fresh attention to the remarkable industrial development of the United States. In the decade between 1870 and 1880 the manufactures of this country increased with such rapidity that, as nearly as can be ascertained from the census figures, the value of the manufactured products in the year 1880 exceeded the value of the products of agriculture. The farming interest is, therefore, no longer the preponderating industrial interest which it was up to a very recent period.

The wonderful expansion of the great branches of manufacturing industry in recent years is largely owing to the stimulus imparted by the building of thousands of miles of railroads; the demand for railroad equipment; the accession of hosts of immigrants who had to be clothed and fed, and supplied with all kinds of utensils and implements; the settlement of great areas of new territory; the abundance of money and consequent reasonable rates of interest, and the complete freedom of our people from any sort of internal or external political complications, which always interfere with material progress. The figures collected by the Census Office, many of which are for the first time made public through the Compendium, are the best standard we have by which to measure the great advance which has been made in manufactures. We are fortunately able to go back as far as 1850 and show the very striking difference between the condition of the manufacturing industries then and in 1880. Some of the leading manufacturing industries, such as the iron and steel interest, collect and publish their statistics of production from year to year, and these statistics to some extent displace the census statistics and divest them of their prominence, but in comparing details and in ascertaining decennial progress the census figures are all-important.

An investigation of the census statistics of the iron and steel trades from the seventh census, that of 1850, shows that marvelous progress has been made in the thirty years which had elapsed between that date and 1880. This is not apparent, however, in comparing the number of establishments, as there were 821 concerns making pig iron, forged and rolled iron and steel in 1850, against 1005 in 1880; but it must be remembered that in 1850 the establishments were small and embraced many charcoal furnaces and bloomeries, whose places have since been taken by large coke and anthracite furnaces and extensive rolling mills. When the number of hands employed is considered, the advance made is very strikingly shown, as in 1850 only 32,083 were enumerated, against 140,978 in 1880. The capital invested in 1850 was only \$31,130,436, against \$230,971,884 in 1880. The wages paid in 1850 amounted to only \$8,686,204, against \$55,476,785 in 1880. The value of the products in 1850 was only \$28,859,593, against \$296,557,685 in 1880. These facts and a few others are succinctly shown in the following table, in which the figures for 1860 and 1870 are inserted, in order to mark the progress made in intervening decades:

	1850.	1860.	1870.	1880.
Establishments .....	821	821	723	1005
Hands employed .....	32,083	32,083	38,543	140,978
Capital invested .....	\$31,130,436	\$31,130,436	\$40,759,047	\$230,971,884
Wages paid .....	\$8,686,204	\$8,686,204	\$12,310,537	\$55,476,785
Value of materials .....	10,830,364	10,830,364	34,210,444	101,271,130
Value of products .....	28,859,593	28,859,593	56,190,974	296,557,685
Total product, net tons.	Not given.	Not given.	Not given.	2,752,475

From the above figures we have ascertained that in 1850 the average number of hands employed in each establishment was a little over 36, against over 140 in 1880, indicating that the iron works of 1850 were very small concerns, when compared with their successors after a lapse of 30 years. The average value of the product per single hand employed in 1850 was only \$901, against \$2,103 in 1880, demonstrating the greater efficiency of the methods employed in 1880, even if allowance is made for some products of high value turned out in 1880 which were of a kind not produced in this country in 1850. The average wages earned per hand employed in 1850 was only \$271, against over \$394 in 1880, which is another very strong point of superiority of the latter period over the former. If any further demonstration of the smallness of the iron works of 1850 were required, it would be found in the fact that at that time the average capital invested in such works was only \$37,918, against \$230,817 in 1880.

The iron foundries of the country present an equally interesting field of comparison between 1850 and 1880 to that above drawn for the manufactures of pig iron, forged and rolled iron and steel. In 1850 there were 1391 foundries, which had increased to 3450 in 1880. This shows very great growth in the number of establishments, especially in



comparison with the other works above referred to, but foundries are more easily built than blast furnaces and rolling mills are, they require much less capital for their operation, and they are generally built to do local work. The hands employed increased from 23,589 in 1850 to 63,702 in 1880. The average number of hands employed in each establishment varied but little at the two dates, being 17 in 1850, against 19 in 1880. The capital invested increased from \$17,416,361 in 1850 to \$87,852,649 in 1880. This was a great advance on 1850, for in that year the average capital invested in each establishment was only \$12,520, while in 1880 it was, \$25,464. The wages paid in 1850 amounted to only \$7,076,700, against \$37,486,689 in 1880. The wages for 1880 were very much better than those for 1850, for in the former year the average per hand employed was \$562, against \$300 in 1850. The value of the products turned out in 1850 was only \$25,108,155, against \$159,749,149 in 1880. This shows that the workmen of 1880 were worthy of their increased wages over their predecessors of 1850, for the average product per hand in the former year was \$2395, against only \$1064 in 1850.

The discovery of an error in the rates on hoop iron, as published in the tariff bill furnished by the Treasury Department to the collectors, occasioned last week considerable commotion among those interested. The provision in the conference committee report on hoop, band, scroll and other iron thinner than No. 10 and not thinner than No. 20 wire gauge was 1.2 cents per pound. In the edition of the bill referred to above, the provision read "thinner than No. 10 wire gauge, and not thinner than No. 20 wire gauge, rate one and two-tenths of one per cent. per pound;" or, in other words, while the conference committee's report levied a duty of 1.2 cents per pound on hoop iron from No. 10 to No. 20, in the bill as published, a duty of 1.2 per cent. per pound was levied. The wording of the bill, as published at the department, seems to have been a typographical error, but if it had not been and had been an error in transcribing the bill, so that the true wording would have been 1.2 per cent. per pound, it would be difficult to see how the law could have been applied. What 1.2 cent's per pound is, or what 1.2 of 1 per cent. ad valorem is, can easily be ascertained, but what rate of duty 1.2 of 1 per cent. per pound is would puzzle the ingenuity of some of the most ingenious interpreters of tariff laws.

Canadians manifest a chronic uneasiness with reference to the existing trade relations with the United States. Last week a motion was carried in the Dominion Parliament calling for any correspondence that may have taken place between Canada and the United States respecting reciprocal trade. It was urged by the mover of the resolution that a treaty was necessary, in order to obtain an outlet for merchandise which is being produced beyond the demands for home consumption. Canadians would undoubtedly prefer that overtures for a treaty come from the other side, but they are something like the rooster picking up oats in the horse's manger, and who said: "Let us be careful and not tread on each other." At the same time, if they are careful that the American eagle shall not tread on them, neither are they disposed to be trampled all over by the British lion. It is galling to them to be compelled to communicate with Washington only through the British Foreign Office, knowing full well that the interests of the Dominion, so far as they relate to trade, are sure to be kept subordinate to those of the manufacturer in "the mother country." Their leading strings are kept too tight for comfort, especially where the development of local industries is concerned.

In some of the best high-speed engines built at the present time there is a notable falling off in pressure during the stroke, and when cutting off at anywhere from one-quarter to one-half, the initial pressure usually varies many pounds. The higher the speed, of course, the worse this is, and in the locomotive the point of cut-off is sometimes ascertained with difficulty. Theoretically, the port opening ought to increase in proportion to the increased speed of the piston, and when the piston is moving the fastest the port ought to have the greatest area. With the eccentric this is impossible, but the question comes up, is the eccentric the best means of moving a valve? Would it not be better to apply a cam? The valve would then be moved at the right time and to the right distance, and stop when open or closed. There would be no extra movement and no need of grinding along over the ports with a full pressure of steam on one side and a vacuum underneath. We take it that in a properly constructed engine there should be four valves, and these should be moved only when in equilibrium. If we compress until boiler pressure is reached, the steam valve can be opened when the pressure on both sides is practically the same and the valve balanced. When this valve is closed, nearly the same conditions prevail. The exhaust valve can then be opened with very little difference between the atmospheric pressure and that in the cylinder, and the same conditions will also prevail at the moment of its closure. Of course, wear under such circumstances

must be reduced to a minimum, and will be less than in the best balanced valves. Looking about at the most successful engines in the country, we find this principle has been very closely adhered to, and even some engines that are supposed to be not quite up to the most advanced practice have held their own and produced surprisingly good results, and, if examination be made, the economy can be traced in a very considerable degree to the clever use of four valves instead of one.

A good deal of interest has been expressed recently in the reversed blue process, by which blue lines are obtained on a white ground in copying tracings. Many efforts have been directed toward attaining this result, and several processes are in the market. Most of them are expensive and said to require a considerable extra amount of labor. The process of obtaining brown or gray lines on a white ground, while more easily obtained, has the disadvantage, we believe, of being a trade secret and done to order. When any attempt is made to go beyond the simple blue process, the amount of photographic and chemical knowledge needed, in addition to a considerable amount of skill in manipulation, is usually too great for the ordinary draftsman. Very few of them have either the time or the inclination to read up on the subject and experiment sufficiently to achieve success. The cost of learning the trade, and the greater cost of practicing it afterward, together with its uncertainties and the effect that the blue lines on the white ground are not as clear or as durable in the shop as the common blue print, are sufficient reasons for adhering to the present plan.

Portugal is making a strenuous effort to secure from the United States a full representation of agricultural implements at the exhibition to be held in Lisbon in May next. A dispatch from Mr. Francis, the American Minister, says the King will preside, assisted by a body of men representing the best intelligence and ability of the realm. Liberal inducements are offered to inventors, but we notice that some misgivings are expressed lest advantage be taken of their skill without reciprocal benefits.

#### American Steam Yachts.

Steam yachts in America during the past few years have been vastly increased in size and fitted with materially improved machinery. Speed has been the objective point in the construction of these boats, and builders of hulls, as well as engineers, have taxed their ingenuity severely to that end. The Stranger and Corsair, of the New York Club, followed by other large vessels of similar type, marked the beginning of the improved steam yacht in this country. True, many boats undeserving the appellation of steam yachts were to be found on the lists of some yacht clubs for years before, but they were of indifferent account and only fit for inland waters. Specialists are now designing this type of pleasure craft, and size, power, rig and accommodations are being looked after with a nicety of detail which means that in the near future the fleet of American steam yachts may be pointed to with pride. The cruising steam yacht, containing all the conveniences of a home, and able to make a voyage of any reasonable length, with marked economy in the consumption of coal, is not now in the undeveloped state it was a few years ago, and the number of new boats of an improved type which will be seen during the coming season justifies the belief that the days of worthless steam toys have passed, and the ill-shapen launches of a few years ago are being replaced by productions by naval architects of established reputation, fit for any service.

The construction of yacht boilers of steel by American builders shows that the improvements made in this important particular in England have not passed unnoticed in this country. Again, though the hulls of our large steam yachts are iron, there is considerable discussion in engineering circles regarding the use of steel for yacht-building. The construction of steel yachts in Europe has demonstrated that the nature and uses of that material for this purpose are well understood. Many advantages are claimed for steel in its adaptation for plates and frames of yachts, and it is not unlikely that some wealthy gentleman in this country may think it best to build a steel steam yacht at no distant day.

The nominal horse-power of an engine can scarcely be said to have any definite meaning, since there are a number of rules by which it may be computed. In addition to these, numerous engine builders have what may be called proprietary rules. For instance, one builder may say: "I will make a steam engine with a cylinder 10 inches in diameter and a stroke of 15 inches, and I will call it eight horse-power, nominal." Another builder who makes an engine of the same size, and desires to impress purchasers with the idea that he gives them more for the same price than his competitors do, may say: "I'll rate my engine at 16 horse-power, nominal." This illustration represents quite accurately the capricious use that is made of the term "nominal horse-power," and aptly shows how little value may be placed upon it.

We understand that a company, known as the Marshall Steel Co., has recently been formed in Canada, with the view of converting wrought iron into steel by a method peculiarly their own. It is stated that the promoters have applied for a charter to form a joint-stock company, with a capital of \$250,000, and propose manufacturing steel rails and all kinds of railway material for which steel with a soft iron center is preferable, edge tools, files, horseshoes, &c.

#### WASHINGTON LETTER.

(From Our Own Correspondent.)

WASHINGTON, D. C., March 27, 1883.

#### AN OFFICIAL VIEW OF THE TARIFF.

It has been observed by a no less responsible authority than an official paper, that "the changes in the proposed tariff bills which have been complained of as introducing largely elements of uncertainty as to results, were regarded and intended by the Tariff Commission as measures of tariff reform, and the Ways and Means Committee, in the bill submitted by them, appear to have adopted the same view." This appears to be the general view of the subject by all concerned, and the amount of inquiries by attorneys and letters is heaping upon the Treasury Department a vast amount of labor in the way of interpretation of this hasty act of legislation. The chief difficulty in the way of preparing a statement of the actual and average reductions made by the new bill, as compared with the old, and a comparison of the relative workings of the two, is the differences introduced in the classification of merchandise. Besides, the uncertainties of the "not otherwise provided for" classes of merchandise hitherto recognized recognized under the present law, and the specification of those articles under the new, add to the complications. Besides, with respect to imported articles invoiced at interior points in foreign countries, the abolition of port charges, commissions, &c., it would be impossible to give the information desired. From present indications there will be considerable groping in the dark until the practical operations of the bill afford some data upon which to base an estimate. A statement of comparative duties and the relation of the Treasury Department to tariff legislation, prepared by the Chief of the Bureau of Statistics, affords all the authoritative information at present available.

#### DIFFICULTIES OF THE TARIFF.

In illustrating the difficulties referred to, Mr. Nimmo says, respecting the metal schedule: "Under the law now in force the duty on steel in any form 'not otherwise provided for' is 30 per cent. ad valorem, and the duties which were collected from this class of imports amounted during the last fiscal year to \$1,723,353.61, but by the terms of the new bill a large proportion of the articles embraced in this class are enumerated and made dutiable at various specified rates. Certain of these articles enumerated would, in the opinion of the Collector of Customs at New York, be dutiable under the bill at the rate of .3 cent per pound, 1/4 cent per pound, 2 cents per pound and 2 1/2 cents per pound." The definition as to what shall be regarded as iron or steel will involve certain important changes in the administration of the law.

#### "NOT OTHERWISE PROVIDED FOR."

From the best available data respecting the effect on the revenues from metals, the following information has been computed: The classification of steel not otherwise provided for, it is stated, will doubtless be as follows: The value of imports into the United States for consumption during the fiscal year 1882 was \$5,744,512, dutiable at 30 per cent. ad valorem, on which the duty collected was \$1,723,353.61. Of the imports at New York of steel dutiable at 30 per cent., wire rods constitute about 90 per cent., paying duty equivalent to about .0057 per pound, which are in the bill to be dutiable under Clause 3. Steel rivet, screw, nail, fence and wire rods, round, in coils and loops, not lighter than No. 5 wire gauge and valued at 3 1/2 cents per pound or less, at 6 cent per pound. The remaining 10 per cent. would probably be classed under scrap steel, dutiable at .3 cent per pound. Boiler or other plate, dutiable at 1 1/4 cents per pound. Steel axes, &c., dutiable at 2 1/2 cents per pound. Steel ingots dutiable varying from 45 per cent. ad valorem to 3 1/4 cents per pound, according to price.

#### IMPORTS OF STEEL.

A statement prepared pending the discussion of the metal schedule gives the imports of the class of steel in forms not otherwise provided for. It shows that the imports of this class consist mainly of steel wire rods, amounting in value to \$621,368; dutiable at 30 per cent.; duty collected, \$186,410.20. While the rates are not precisely as finally determined in the act of March 3, 1883, they are sufficiently near to form an approximate idea of the information desired, as follows:

Steel ingots, coiled ingots, blooms and slabs, weighing not less than 500 pounds each, &c., valued above 6 cents and not above 10 cents per pound, 87,040 pounds, at 3 1/2 cents.....	\$3,046.40
Steel rivet, screw, nail, fence and wire rods, &c., valued at 2 cents per pound or less, 27,143,093 pounds, at 1/4 cent.....	166,072.22
Crucible cast-steel rivet, screw, nail, fence and wire rods, &c., valued above 2 cents and not above 6 cents per pound, 3,314,377 pounds, at 1 1/4 cents.....	58,001.94
Valued above 10 cents per pound, 182,884 pounds, at 1 cent.....	1,828.84
Steel, in any form not specially enumerated or provided for in this act, 4,763,281 pounds, at 2 1/2 cents.....	119,572.67
Total duties.....	\$189,190.15
Increase.....	\$65,779.75

The estimated duties, computed upon the basis of imports at the port of Philadelphia, is as follows on metals: Collected, \$30,589,354; duty computed, \$34,472,047; increase, \$3,882,693. The estimate of the Appraiser places his figures at \$28,479,053 duty collected, or a decrease of \$1,879,822. The duties collected at the port of Philadelphia amounted to 5.37 per cent. of the total amount of duties collected at all ports of the United States during the year ended June 30, 1882. In this statement no allowance has been made for duties accruing on packages, inland freight, port charges and commissions.

#### INTERPRETATION OF SECTION SEVEN.

Among the ambiguities of the tariff act of March 3, 1883, is a question growing out of a ruling of the Treasury Department in regard to the operation of Section 7. The decision, however, is not as has been generally stated. According to the authorities in customs matters, the point is whether, in an invoice made out for goods shipped before the passage of the new law, where it showed the price paid for all charges to purchasers, the duty could be assessed less than such price. The Secretary of the Treasury has

directed that collectors of customs take the duty on the invoice valuation; meanwhile the parties may protest and appeal as permitted by law. This defect applies particularly where goods are invoiced free on board at so much gross. As the exact sum of the charges is not named, therefore they cannot be deducted. The department can only take the difference must be settled here. In order to do this, it will first be necessary to get the foreign price, deducting the charges. It is thought that this embarrassing question will be removed as soon as the details of the bill reach the countries from which the imports come. The charges, as above indicated, being removed, the question of assessment of duty will be simple.

#### THE PUBLICATION OF INFORMATION.

In the class of cases above referred to, the department has sent telegraphic instructions to the chief customs officers at the principal ports as to their action in the premises. It is intended by the department to issue circulars giving the official interpretation of the provisions of the new tariff act as soon as the changes are thoroughly considered and compared. At present the time of the department is largely taken up with answering questions either by telegraph or letter.

#### ABSTRACT OF OFFICIAL LETTER.

The following is the substance of the letter in reply to various questions for decision in connection with the enforcement of Section 7 of the tariff act of March 3, 1883: "I have to state that in view of the fact that the oaths prescribed by Section 2841 of the Revised Statutes, to be taken on entries, have not been modified, but remain in force until July 1, such oaths should continue in force until that time and the entries must correspond thereto. The more fact, however, that invoices and entries include non-dutiable charges, does not thereby render such charges liable to duty, and in proper cases the duty should not be levied on the charges and commissions when they can be properly ascertained. Where, however, an invoice of goods declares that they have been delivered to the purchaser on the exporting vessel free of all charges to him, the value stated in the invoice must be taken as that upon which duties shall be levied, provided, of course, that the appraiser makes no advance thereon. Goods actually remaining in bonded warehouses or public store when the seventh section of the act referred to took effect may be considered as entitled to a readjustment of the duty under said section, without regard to protest, it being the duty of the department and of its officers to enforce the law as enacted by Congress. The department does not deem it wise or within its authority to enlarge the scope of the act so as to extend the provisions of Section 10, in connection with Section 7, to goods not in public store or bonded warehouse when the act took effect, and which were imported prior to that date. Goods imported prior to the act taking effect, and which remain in general order store, are to be considered as in bonded warehouse, and the rule laid down applied accordingly."

#### COMPILING THE TARIFF ACT.

The officers of the Treasury Department are now engaged in compiling the new tariff act, which will be published as soon as completed. Each paragraph will be numbered, with an alphabetical index referring to the numbers, with the matter so arranged as to indicate the changes in the new, as compared with the old rates, as far as possible. Out of 800 items in the new bill, one-half are identical with the old. This being the fact, the officers of the department are much encouraged in the opinion that the task of putting the new bill in force will not be as difficult as at first supposed.

#### THE REVENUES OF THE GOVERNMENT.

Since the passage of the new tariff act an estimate has been prepared showing the probable revenues of the Government in view of the reductions made. The figures given are as follows: Customs, \$220,000,000; internal revenue, \$143,500,000; miscellaneous, \$40,500,000. Total, \$404,000,000. The revenues for 1883: Customs, \$220,400,000; internal revenue, \$146,500,000; miscellaneous, \$36,618,000. Total, \$403,518,000. It will be observed that, notwithstanding the reductions, the revenues keep up.

#### METALLURGICAL NOTES.

##### Basic Furnace Linings.

According to a paper submitted in a recent issue of Dingler's Polytechnisches Journal, it appears that the carbonates of soda and potash are used, instead of the corresponding chlorides of these metals, for the purpose of making basic-furnace linings for dephosphorizing pig iron, and that the durability of such linings is increased by the addition of cryolite. The following method of preparing the lining has been found to give very satisfactory results: The raw or calcined masses of lime, dolomite or magnesite are ground and mixed with the flux, and the mixture is then burnt to dust and worked up into bricks, the binding material being tar treated with 3 per cent. of flux. When the flux is made up of alkaline carbonates, ground calcined phosphate or boneblack, with the addition of a few per cent. of the alkaline carbonates, are used in the preparation of basic bricks, muffles, &c. The basic masses are to be burnt at a high temperature, then pounded and ground, and the powder thus obtained formed into bricks, with the addition of freshly prepared sulphate of lime; 2 per cent. of the latter suffices to form a plastic material. Still another method, that proposed by Borsig, consists in mixing dolomite limestone, either in a crude, calcined or finely divided form, with from 2 to 2.5 per cent. of crude boric acid or 3 per cent. of fused and powdered borax, and the resulting mixture is used, in a dry or wet condition, for lining the furnace or for preparing the bricks. According to the Verein Hoerde and the Rhensish Steel Works, at Ruhrort, limestone, free from magnesia, containing not more than from 15 to 20 per cent. of silicic acid, alumina, iron oxide and manganese oxide may be used for the preparation of basic linings. The quantity of oxide of iron, however, should, as a rule, not be greater than 6 per cent. It was further found that phosphorus can be eliminated

without an after-blow by the use of fluorspar equivalent to one-tenth part of the tribasic lime phosphate formed.

#### The Relative Corrosion of Iron and Steel.

In a recent issue we referred briefly to the experiments on the relative corrosion of cast iron, steel and wrought iron, which were made some time since by M. Gruner, and an account of which was submitted to the Paris Academy of Sciences a short time since. We are now in possession of a more complete statement relating to the subject, and think that a brief recapitulation of our former remarks, together with the additional particulars, will be of interest. M. Gruner submitted 18 polished plates of steel and hard and soft iron, pure and impure, of various kinds, to a series of identical experiments. The plates were all one decimeter (3.73 inches) square, and in order to submit them to precisely similar experiments they were fixed in a wooden frame. The plates were suspended by their four corners 15 mm. (about 0.6 inch) apart, and could all be plunged simultaneously into a trough containing either acidulated water (containing 5 per cent. of sulphuric acid) or sea water. Suitable arrangements were also made so as to enable the operator to place them in moist air on a terrace exposed to all the winds.

The first experiments were made last winter at a factory at St. Montant, near De Beauvoir; others during the spring and autumn in Paris, and a much greater number during the course of the summer on the seashore at Villerville, in Normandy, but always with the same series of plates and the same apparatus. These plates are weighed before and after each experiment, and carefully brushed and dried. These are the chief results arrived at: The experiments in moist air were not continued a sufficiently long time to enable one to determine whether the degree of carburization of the steel, and the moistening of the plate, had any influence or not upon the intensity of the corrosion by rust. It was found, however, that in 20 days the steel lost at least from 3 to 4 grams per plate, the two faces of the plate being equally corroded. Chromium steel, as stated in our former article, was more rapidly oxidized, and Wolfram or tungsten steel less than ordinary steel. Cast iron, even that containing manganese, was found to oxidize less than steel or wrought iron, and among them the white specular cast iron (spiegel), containing 20 per cent. of manganese, less than the gray cast iron. Sea-water attacks iron like acidulated water, by dissolving it; but the conditions are entirely different. At the end of a very short time the presence of iron chloride is recognized in the trough. Unlike the action in moist air, the sea water more strongly attacks the cast iron than the steel, and, above all others, most energetically the white specular cast iron (spiegel). Thus, in nine days the steels had only lost for 0.02 mg. of surface from 1 to 2 grams, according to their nature, while the white manganese cast iron had lost 7 grams; the black cast iron of St. Montant, from the Bessemer works, 3.50 grams, and the phosphatic cast iron, for pottery purposes, 5 grams. Soft steels are less attacked than the same steels annealed; soft steels less than chrome or manganese; Wolfram steel less than ordinary steel, with the same percentage of combined carbon.

It follows from this that it is necessary to avoid the employment of manganese sheet steel in the hulls of ships, and, according to experience, corrosion is much more active along the line of flotation than where the metal is always in the air or always under water. Acidulated water, like sea water, dissolves more rapidly the gray cast iron than steel, but not the white specular cast iron—spiegel. It is the impure gray cast iron which is the most readily attacked. Thus, in three days, water containing 1/2 per cent. of sulphuric acid, renewed each morning, dissolved the following quantities:

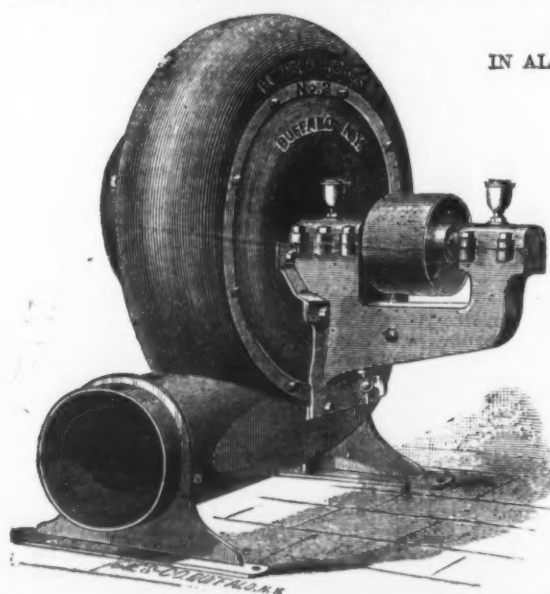
	Grams.
Black cast-iron for the Bessemer furnace, containing 3 to 4 per cent. of manganese, and 1 to 2 per cent. of silicon.....	15.2
Phosphatic gray cast for pottery.....	6.2
White specular cast iron.....	1.5
The same as above, sanctified with charcoal, soft steels, under the same circumstances, only lose.....	0.4
Soft steels simply carburized.....	1.1
Manganese steel, and hard tempered.....	1.6
The same soft steel.....	4.1

That is to say, much more than the white specular cast and the cast iron obtained with charcoal. It is found by these experiments that acidulated water like sea water attacks more energetically chrome steel than pure steel, and rather less Wolfram steel. We see, finally, that if in respect to chromium, manganese and tungsten, the action of acidulated water is rather less than that of sea water, it is quite different in other respects, and altogether different to the action of moist air. From the experiments with acidulated water, we are not able to obtain any knowledge of the relative resistance of different sorts of iron in moist air or sea water.

The other day we had occasion to investigate pretty thoroughly the character, properties and uses for straw lumber. As some of our readers know, this is an article manufactured at the West, and turned out in boards or sheets 33 inches in width by 12 feet in length, and of various thicknesses. It is heavier than black walnut, has no grain, is of the color of straw-board, though considerably darker, and is much stronger and stiffer than ordinary timber. Though made in considerable quantities at the present time, the supply seems hardly equal to the demand. There are advantages in this material which in the near future will probably make it of the highest value, not only for carpenters and architects, but for the car-builder, and, in fact, for mechanics generally. Its toughness, the firmness with which it holds nails and screws, the ease with which it can be cut, and the fact that it can be bent by the aid of heat, shaped in dies, and is not liable to shrink or warp, and is little affected by water, even when unprotected, makes the range of its probable uses extraordinarily great. It seems to be a non-conductor of heat and electricity. It can be rolled up into pipes of great strength and light weight, and is available for a range of uses for paneling purposes for which we have no equivalent.



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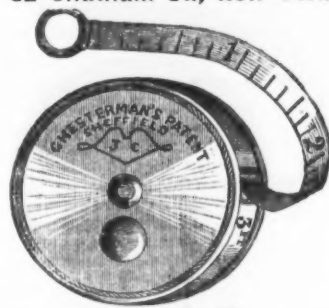
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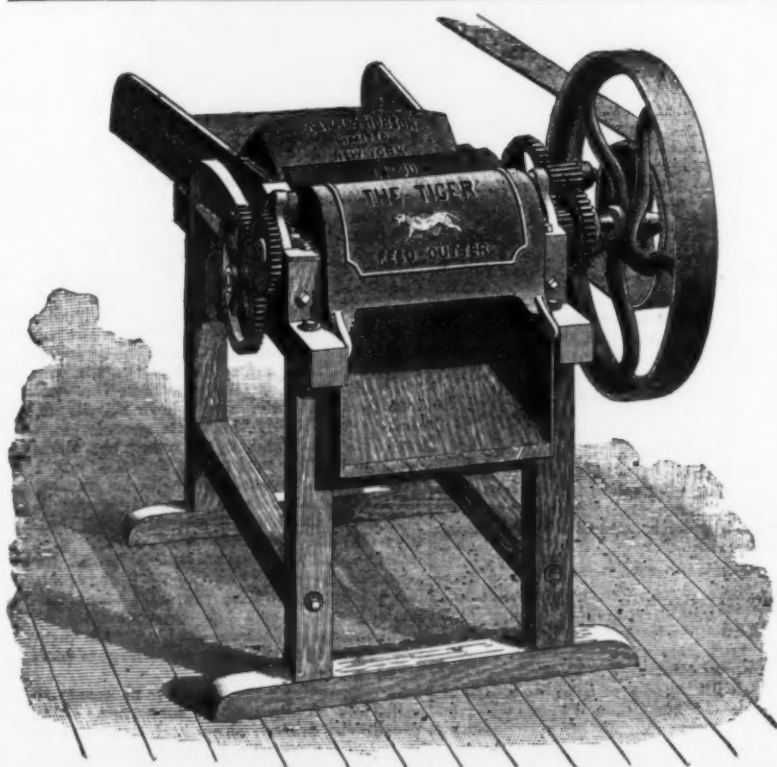
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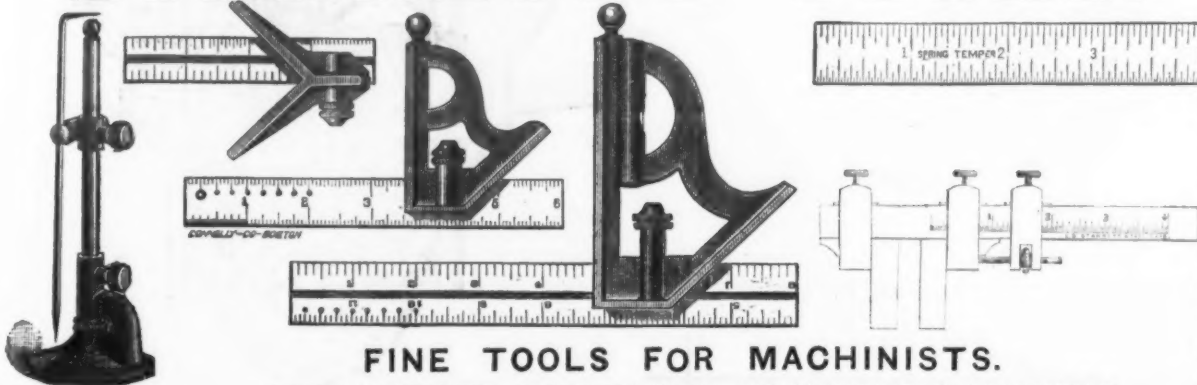
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### Difficulties in Early Railroad Building.

In the early days of railroads, mechanical and engineering problems were by no means the most difficult to be overcome. The early projectors often found quite as much difficulty in meeting the opposition of the people as they did the mechanical difficulties which presented themselves. The late Josiah Quincy has left some particulars in regard to this, and from a chapter devoted to this particular phase of railroad building we take the following:

Perhaps the most singular phenomenon in the history of each railroad was the bitter opposition they encountered from leading men whose convenience and pecuniary interests they were directly to promote. The believer in railroads was not only to do the work and pay the bills for the advantage of his short-sighted neighbor, but, as Shakespeare happily phrases it, "Cringe and sue for leave to do him good." Can I furnish proof of this incredible statement? Yes, I have it before me at this moment, and it is worth giving with some detail.

The old town of Dorchester, which some years ago was annexed to Boston, has within its ancient limits nine railroad stations, and at those most frequented about 50 trains stop daily. The main road, known as the Old Colony, passes over a route which I caused to be surveyed at my own expense, with the view of providing cheap transportation from the towns of Dorchester and Quincy and others to the south of them. I need not say that the land made accessible by this railroad has become very valuable, and that the business and population of the old town of Dorchester cluster about the stations. If any tyrant could tear up those tracks and prevent them from being relaid, his action would paralyze a prosperous community, and might well be called a calamity by those most careful in weighing their words. Now, can the reader believe that the very words I have italicized were chosen so late as 1842 by the inhabitants of the town of Dorchester, in regular town meeting assembled, to express their sense of the injury that would result to them and their possessions by laying a railroad track through any portion of their territory? No, there can be no mistake about it. Here is the report of their meeting, authentic in contemporaneous type, and duly attested by Mr. Thomas J. Talman, Town Clerk. A leading business man was chosen moderator, and a committee of six prominent citizens was appointed to oppose the passage of a railroad through the town. The resolutions are worth reporting with fullness. The first declares it to be the opinion of the inhabitants of the town of Dorchester that a railroad upon either of the lines designated by those asking for a charter "will be of incalculable evil to the town generally, in addition to the immense sacrifice of private property which will also be involved. A great portion of the road will lead through thickly settled and populous parts of the town, crossing and running contiguous to public highways, and thereby making a permanent obstruction to the free intercourse of our citizens, and creating great and enduring hazard to all travel upon the common roads." The second resolution declares that if, in spite of the protest of the inhabitants of Dorchester, their town must be blighted by a railroad, "it shall be located upon the marshes and over creeks," and by thus avoiding all human habitations and business resorts, "a less sacrifice will be made of private property and a much less injury inflicted upon the town and public generally." The concluding resolution is one of those jewels (rather more than five words long) that must suffer by any curtailment:

"Resolved, That our representatives be instructed to use their utmost endeavors to prevent, if possible, so great a calamity to our town as must be the location of any railroad through it, and if that cannot be prevented, to diminish this calamity as far as possible by confining the location to the route herein designated."

The italics are, of course, mine. They are quite irresistible. But when "calamities" threaten, the good man does not do his whole duty by protesting in town meeting. There is the powerful agency of the press, through which oppressors may be rebuked and their horrible projects brought to naught. Let me quote a few extracts from a newspaper article. It was written by a citizen of Dorchester and appeared shortly after the meeting. The writer has been speaking of existing facilities for water transportation, which he thinks should content certain inhabitants of the town of Quincy who are petitioning for a railroad:

"What better or more durable communicative can be had than the Neponset River or the wide Atlantic? By using these our thriving village will be destroyed, our enterprising mechanics ruined, our beautiful gardens and farms made desolate, and our public or private interests most seriously affected. Look at the rapid growth of Neponset village, through which this contemplated road is to run (the citizens of which are as enterprising and active as can be found, many of whom have invested their all either in trade, mechanical manufactures or real estate), and all—all are to be sacrificed under a car ten thousand times worse for the public than the car of Juggernaut! Look at the interests, for instance, of the public house in this place, kept by a most estimable citizen, who has ever—"

But I have no heart to copy further. In the wreck of an entire community we can spare no tears for the woes of a single tavern-keeper. The ruins of that once prosperous village of Neponset are even to this day visited by reflective tourists. I think I mentioned that the Old Colony Co. have a way of stopping some 50 trains there in order to accommodate moralists who take a melancholy satisfaction in musing among them.

### NEW PUBLICATIONS.

PRACTICAL MECHANICS. By John Perry, M. E. 276 pages; size, 4 1/2 x 7 inches. Price, \$1.50. Published by Cassell, Pether & Galpin.

This little work commences with an introductory paragraph which is exceedingly prepossessing. It is devoted to "What I expect the reader to know already." As the book is a very practical one and may be of value to many of our readers, we can hardly do better than to state what this necessary knowledge is. In the first place, the reader is expected to know the meaning of decimals in arithmetic. The next thing is that the reader must not only own a box of drawing instruments, but must be able to set off any angle when stated in degrees, and draw a triangle to scale when one side and two angles, two sides and one angle, or when three angles, are given. In other words, there must be about as much knowledge of a box of drawing instruments and their use as can be learned in a single lesson. Third, he must know that a letter of the alphabet or any other symbol may be used to represent a physical magnitude. Lastly, the symbol signs representing addition, subtraction, multiplication and division, and that for the extraction of the square root, must be understood. Lastly, the reader is expected to know the elementary principles of mechanics, and by this we take it that the author means he must have had some experimental experience with machines and their construction. Now, to sum this up, we find that the knowledge necessary for reading this book through, understanding it and using it as a book of reference, is not beyond what every mechanic has or ought to have. Not having yet had time to go through the work thoroughly, we do not know how well the author has kept the promise of the opening chapter, save from hasty glances here and there. These, however, are eminently satisfactory, and we put the book upon our shelves with the feeling that we have something that can be recommended to the apprentice or the uneducated man at the bench as well as the more advanced student, even though they be somewhat afraid of algebra.

EXTRACTS FROM CHORDAL'S LETTERS. By Chordal. 366 pages; 5 x 7 1/4 inches. Steel portrait of author, and many illustrations. Price, \$2. Published by John Wiley & Sons.

We suppose everybody knows Chordal, or at least has read "extracts" from his letters. They run from grave to gay, and cover almost every topic which has entered into the minds of engineers or mechanics. Chordal has given literature a couple of characters. True, they are not particularly well defined, nor has he written us a story of their lives, but in the minds of his readers they are as real and living personages as any that have been created by Dickens or Thackeray. In fact, everybody knows Wycoff and Sackett. They are found the land over where machine shops exist. The wit, the plain, hard common sense, the fresh way of looking at things—and, in fact, everything about the book—make it one of those which the practical man picks up for both recreation and profit at many an odd moment. The present edition has been enlarged, and 75 pages of additional matter inserted. The engravings are also more numerous than in the first edition.

PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

We have just received Volume XXX of the above proceedings, which, as in former years, embraces a large amount of interesting and valuable information. It gives a complete account of the 30th meeting, held at Cincinnati, Ohio, and its careful perusal cannot but be of value to the reader. The volume is finished in a paper cover, and contains some 424 pages.

PROCEEDINGS OF THE SOCIETY OF ARTS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY. Size, 6 by 6 inches; 146 pages.

This is an abstract of the proceedings for the twentieth year, and embraces meetings from the 27th to the 28th inclusive. It is full of good things, and the only protest one has to make is that the descriptions and discussions have not been given at greater length. The subjects cover a very wide range and embrace almost everything of a scientific character. The last 30 or 40 pages are devoted to Professor Lanza's reports on "Full Size Wooden Mill Columns."

**Launch of the Terror.**—There was a great crowd of people at Cramp's shipyards on Saturday afternoon last, to witness the launching of the steel monitor Terror, and the steam and sailing craft on the river were gay with bunting. The stays were knocked away at 2.05 o'clock, and the Terror slid gracefully down the ways and ran into the Delaware, amid cheers from the people on board, in the yard and on the vessels gathered about the scene. The Terror has been building since October, 1874. She has been constructed under numerous contracts, and several more will be necessary before she is ready for service. The sum of \$516,774.80 was expended upon her up to last May, and the Messrs. Cramp estimate that by the time she is finished in every way the cost will reach \$800,000. A contract was first taken by the Cramps for putting up the frame of the vessel; then followed another for plating; then one for the boilers. This contract was followed by another for building and completing her, but in March, 1877, Secretary of the Navy Thompson ordered all work on her to be suspended. This suspension, which order also included work on the monitors Miantonomah, Amphitrite, Monadnock and Puritan, in course of construction at other yards, was continued until within the past few months. The dimensions of the Terror are: Length between perpendiculars, 250 feet; extreme breadth over armor, 55 feet 10 inches; extreme depth over armor, 17 feet 3 inches; depth of hold, 14 feet 8 inches. The delay in her completion has resulted in the advantage of substituting steel for iron in the construction of her turrets and breech-loading guns.

At Senegal, Africa, the first locomotive has just made its appearance, while the first mile and a half of the French railway between Senegal and the Niger was opened on December last.

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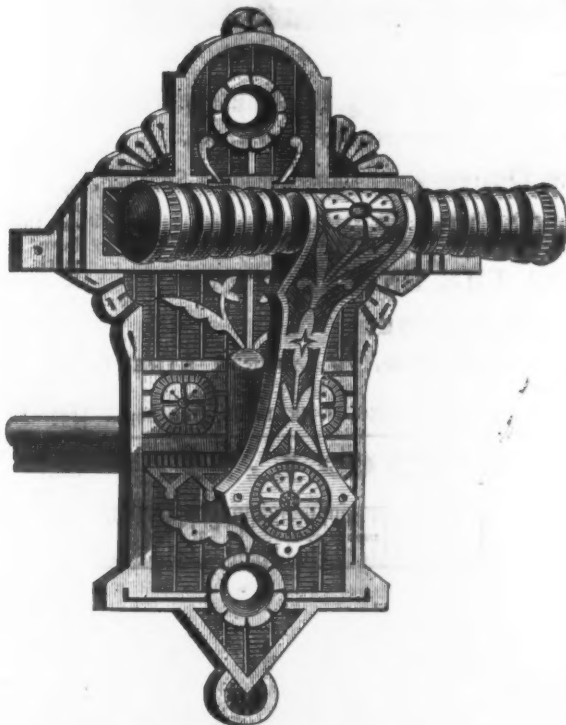
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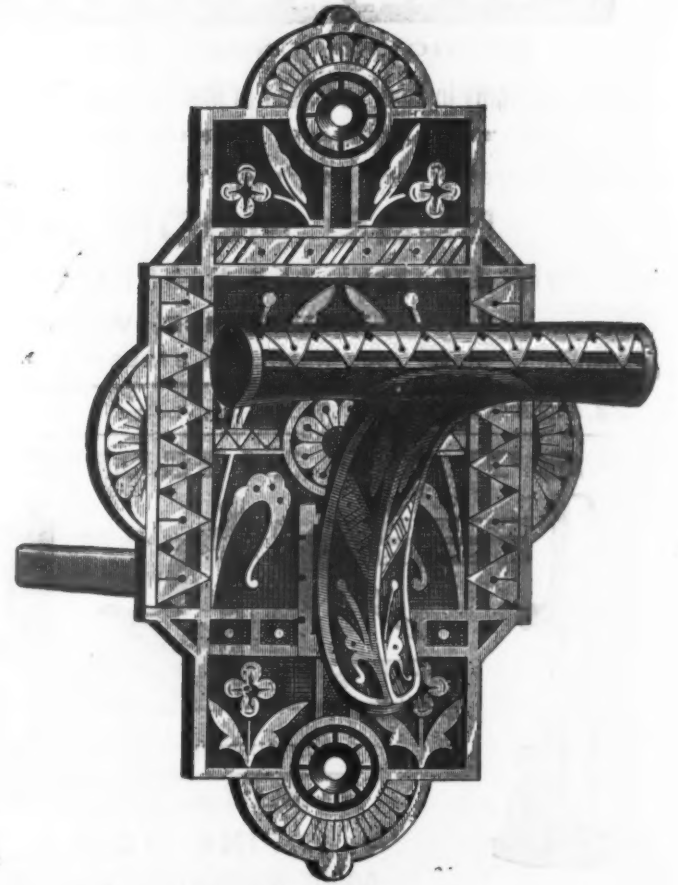
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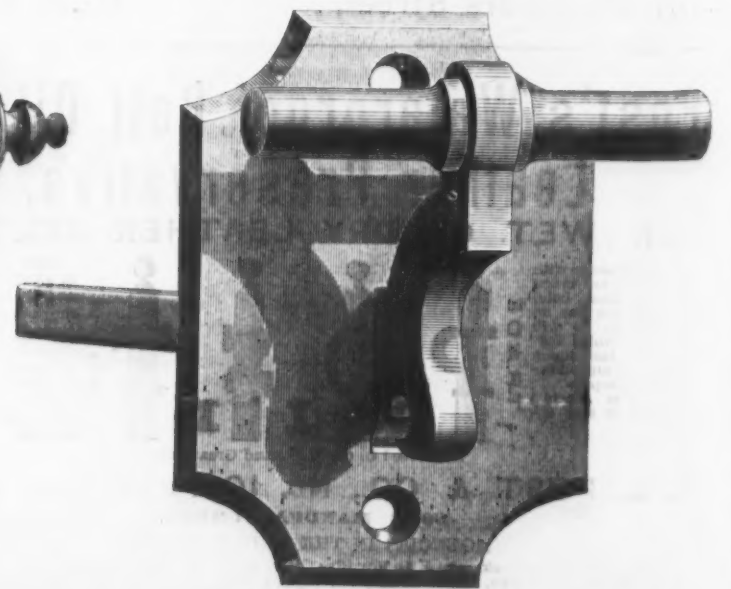
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## SCIENTIFIC AND TECHNICAL.

## The Movement of Water in Plants.

M. Julien Vesque has devised a simple method of demonstrating the transfer of water in the stems of plants, which promises to have a wide application. The stem is cut obliquely during immersion in water, and the thin part of the severed stem is placed in the field of the microscope. After the cover glass is adjusted, and the stem is securely fastened, so that it cannot be easily disturbed by subsequent treatment, a very little freshly precipitated calcium oxalate or other finely divided substance is introduced under the cover. If the leaves have not been removed from the stem, a rapid current is at once observed to flow toward the cut surface. The insoluble salt collects at the open mouths of the vessels, often passing into the capillary tubes after a temporary stop, and the same phenomenon is repeated several times as the minute plugs are formed and then sucked in. With lower powers of the microscope it is possible to use a second slip instead of the thin cover, and then the simple apparatus can be held more firmly in its place. In any case it is possible to measure the rapidity of the current by means of a micrometric eye-piece. When the stem is quickly stripped of its leaves the current is stopped at once, but when, on the other hand, a leaf or a part of the stem is pinched, there is immediately a back flow of water. It is undoubtedly well known that two conflicting views have been held as to the channel by which the upward movement of water in wood takes place. Some think that the transfer is solely by imbibition, and that no free water is carried from cavity to cavity of the wood-element—rather, that no free water exists in the cavities. Others have held that free water is carried from one wood-element to another, and that the walls themselves play only a subordinate role. To these opposed views may be added a third, which appears to be a compromise—namely, that water in a free state actually exists as a thin lining on the cell-wall. The chief advocate of the latter view has, however, abandoned it in favor of the imbibition theory. A recent publication by Elfving (*Bot. Zeit.*, Oct., 1882) details the results of experiments which considerably strengthen the "cavity" theory. Now, just at this point come observations of Vesque, in a continuation of the paper regarding the method of direct demonstration, which go far toward showing that here, as was long ago suspected, the truth is to be found between the extremes. These experiments, which need to be carefully repeated, indicate that under certain circumstances the transfer of water takes place by means of the cavities themselves, but that in all cases they may serve the part of reservoirs. Moreover, the caliber and length of the vessels regulate the rate of transpiration, resistance to the movement of the water following the law of Poiseuille, so that the resistance is inversely proportional to the fourth power of the diameter, and directly proportional to their length.

## Ancient Mode of Baking Walls.

Among the recent discoveries at Hissarlik, by Doctor Schliemann, are the remains of buildings which he supposes to have been temples. Nothing, he says, could better prove the antiquity of the buildings than the fact that they were built of unbaked bricks, and that the walls had been baked after they were laid up, by huge masses of wood piled up on both sides of each wall and kindled simultaneously. Each of the buildings has a vast vestibule, and each of the front faces of the lateral walls is provided with six vertical quadrangular beams, which stood on well-polished bases, the lower parts of which were preserved, though, of course, in a calcined state. Doctor Schliemann maintains that in these ancient Trojan temples we may see that the *antæ* or *parastades* (pier-formed ends of the side walls of temples when they are prolonged beyond the faces of the end walls), which in later Hellenic temples fulfilled only a technical purpose, served as an important element of construction, for they were intended to protect the wall ends and to render them capable of supporting the ponderous weight of the superincumbent cross-beams and the terrace. Similar primitive *antæ* were found in two other edifices, and at the lateral walls of the northwestern gate. It was also discovered that the great wall of the ancient Acropolis had been built of unbaked bricks, and had been baked like these temple walls. According to Doctor Schliemann, a similar process of baking entire walls has never been before discovered, and the *antæ* in the Hellenic temples are nothing else than reminiscences of the wooden *antæ* of old, which were of important constructive use.

## Hardening Concrete.

A new method of hastening the induration of concrete blocks was recently described before one of the scientific societies of Great Britain. According to this method, the concrete is made and rammed into the molds in the usual manner, after which the molds are placed in a chamber, which is maintained at a moist heat of about 100° F. This is said to favor the crystallization or setting of the cement, and allows the blocks to be removed from the molds in the course of a few hours. The concrete is then placed in a bath composed of one part of silicate of soda and 12 parts of water, raised to a temperature of about 110° F. The solution penetrates to the center of the block, which is thus hardened throughout instead of merely on the surface, as in the usual process. In three or four days, it is said, the blocks attain the strength of ordinary cement three or four months old.

## Asbestos Rope.

Asbestos rope is described among other articles now being turned out by the United Asbestos Co. of Great Britain. The strength seems to be about one-fourth that of ordinary hemp rope of the same diameter. Rope 1½ inches in diameter is stated to have a breaking strength of 1 ton, and 20 feet of it weigh 13½ pounds. It is made especially for fire-escape purposes, for theaters, fire brigades, and for ready means of escape from houses and public buildings, its advantage being that it will not break and drop its burden if a flame bears upon it. It is

made like ordinary rope, but spun from Italian asbestos thread, and there seems to be every probability of its favorable reception by the public.

## Earth Currents and Solar Spots.

Among recent interesting contributions relating to the above subject, we would mention a paper recently read by Mr. J. S. Adams before the British Society of Telegraph Engineers and Electricians. Mr. Adams had given considerable attention to the subject, and submitted his observations in a tabulated form, so as to render them more convincing. Referring to the sun spots of last November, it will perhaps be remembered that their passage was attended by an electric storm of great intensity and range. Mr. Adams observed the effects on telegraph lines between London and Leicester, and showed curves of the disturbances in these lines. He observed also that the electric storm did not continue during the whole period of passage of the solar spots, but only while they were centered on the earth. His inference from this fact is that the solar spots, being rifts in the sun atmosphere, permit the solar body to act more freely in disturbing the electrical condition of the earth, and that the solar atmosphere has really a screening effect on this action. Whether this be true or not, it is an interesting observation that the spots become active when centered on the earth, and, if true, in a general sense, it will enable astronomers and electricians to predict electric storms in future. Professor Adams observed that during the prevalence of spots the sun gives the earth less heat than ordinarily, and this, it is thought, may have something to do with the phenomena.

## An Artificial Aurora.

According to *Engineering*, of London, England, M. Lemstrom, the well-known professor of Helsingfors, who makes a study of auroral phenomena, has recently succeeded in producing what may be considered as an artificial aurora on a small scale. During the past winter he chose a station in Finland, just within the Arctic circle, where there are two conical hills, one about 2000 feet and the other about 3000 feet high. He connected the tops of these hills to the earth at their bases with a network of copper wire, and one evening was rewarded by observing a luminous circle proceeding from the summit of one of the hills and reaching an estimated altitude of 360 feet. This terrestrial discharge into the atmosphere was electrical, the electricity being of positive sign.

## Bids for Ironwork in the New Pension Building.

On the 20th inst. there were opened in the office of the Supervising Architect, Gen. M. C. Meigs, 12 bids for about 70 tons rolled wrought-iron bars, 41 and 16 feet, and 1 foot long, for ties and anchors for the walls of the new Pension Office. The bids were as follows:

No.	Bidders.	Residence.	Place of delivery.	Price per pound.		Remarks.
				16 ft. bars.	41 ft. bars.	
1	J. F. Bailey & Sons	Philadelphia	Washington	2.3	2.3	Tensile strength, 45,000 lb. per sq. in. All this is to be used in the square inch of 22 tons to the square inch—49,260 pounds.
2	Albany and Iron Co.	Troy, N. Y.	Washington	2.3	2.3	
3	Ans. Rowland & Co.	Philadelphia	Washington	2.3	2.3	
4	Ans. Rowland & Co.	Philadelphia	Washington	2.3	2.3	
5	Phœnix Iron Works	Richmond, Va.	Washington	2.3	2.3	
6	Phœnix Iron Works	Richmond, Va.	Washington	2.3	2.3	
7	Morris, Wheeler & Co.	Philadelphia	Washington	2.3	2.3	
8	Remond Iron Works	Philadelphia	Washington	2.3	2.3	
9	Co. Jersey Steel and Iron	Trenton, N. J.	Washington	2.3	2.3	
10	Jas. McGill	Washington	Washington	2.3	2.3	
11	C. A. Schneider's Sons	Washington	Washington	2.3	2.3	
12	J. E. Kendall	Washington	Washington	2.3	2.3	

## Fire-Resisting Dwellings.

An interesting experiment, conducted with the view of testing a new fire-resisting plaster, was recently conducted in London, England. A brick building had been constructed for the purpose of being tested, and a company of practical architects and builders watched the proceedings. The house in which the experiment was made consisted of two rooms, one on the ground floor and one on the first floor, the ceiling consisting of a patent fire-resisting medium known as Hitchen's plaster. Highly combustible materials were placed in the room on the ground floor and on the top of the building, which represented the third story, and these masses were ignited simultaneously and allowed to burn for half an hour. During that time the intermediate room was entered, and, according to available reports, the floor and ceiling showed no marks of destruction, notwithstanding the blazing fires both above and below. In order to complete the test, a large fire was then arranged in that room, the heat being so great as to melt the glass in the windows. The three fires, after having burned for some time, were finally extinguished. Taken altogether, the test is said to have given most satisfactory results, and general satisfaction was expressed at the issue of the experiment.

## INDUSTRIAL ITEMS.

## MAINE.

The Goss Iron Works, at Bath, will begin business about April 1. Three months' work has been already contracted.

## MASSACHUSETTS.

The heaviest piece of machinery ever built in Newburyport was placed on the cars the other day, being the great pumping engine for Newport, R. I. It required over 15 tons of iron, brass and steel for its construction, one steel casting weighing over 700 pounds, and the fly-wheel alone nearly two tons. The new engine proves capable of very high speed, and was made at the machine shop and foundry of Albert Russell & Sons.

The iron furnaces in Lanesboro' will be started about May 1.

## NEW YORK.

Messrs. James Aikman & Co., of New York, inform us that they have opened offices and salesroom in their new warehouse, Nos. 30 and 32 Liberty street, Newark, N. J., connected with their works, where they have a complete stock for the convenience of customers whom it may suit to be waited upon there and have shipment made directly from the factory.

## PENNSYLVANIA.

Stokes & Parrish, of Philadelphia, are now turning out an unusually large amount of work in their particular line, and though they enlarged their works considerably during the past two years, they are taxed to their fullest capacity. Their furnace hoists are in constant demand, and among orders recently entered we would mention a furnace hoist, with its complete outfit, for the Everett Iron Co., whose furnace is at Bedford. The same company were supplied with a mining hoist for a 200 foot shaft. The firm have also just completed a furnace hoist for the Woodward Iron Co., at Wheeling, Jefferson County, Ala., and one for the Shenandoah Furnace, at Milnes, Page County, Va. Considerable activity is also displayed in turning out hydraulic passenger elevators. Among several of the most prominent buildings in which they are being placed we would mention the Liverpool and London and Globe Insurance Co., United Firemen's Association, and the Brown Building, on Walnut street; the Jayne Building, on Chestnut street; three in Wanamaker's Grand Depot, one in the Commonwealth Guarantee, Trust and Safe Deposit Co., of Harrisburg, and many others of almost equal importance.

What is probably the first practical attempt to use compressed air as an underground motor in a coal mine in this country is meeting with success at the Old Eagle pits of W. H. Brown & Sons, of Pittsburgh, 27 miles up the Monongahela. This new motor was built at the Baldwin Locomotive Works, and is a most singular looking affair. The available height above the pit rails being only 5 feet 10 inches, the air locomotive had to conform thereto. The air receivers are 27 feet long and 38 inches in diameter, and made of sheet steel. These are filled with air compressed to 400 pounds per square inch, forming the actuating power of the machine. These air receivers rest on four wheels, driven by a pair of locomotive cylinders, gearing, &c., just as in a railway engine, the air taking the place of steam. The originator of this idea, Capt. Harry Brown, expressed himself as more than satisfied with this locomotive. It does the work of a score of mules, requires the attention of only one man, who also operates the air-compressing machinery, and can haul 55 loaded cars (60 tons) up a gradient of 100 feet to the mile.

Messrs. Robert Wetherill & Co., of Chester, are building a 170-horse-power engine for Goringe's new shipyard at Port Richmond. The boilers are already in place, and the work on the engine is being rapidly pushed forward.

The Hartman Steel Co., of Beaver Falls, have started a portion of the machinery in their new wire mill, and according to present accounts it is working very satisfactorily. The company have just placed contracts for their merchant steel and rod trains, which are designed to be of superior construction. The steel for this plant will be supplied by the Edgar Thomson Steel Works, whose owners, we are informed, are also largely interested in the Hartman Steel Co.

Tinius Olsen & Co., of Philadelphia, recently shipped a 50,000-pound testing machine to the University of Minnesota, at Minneapolis. Hydraulic presses were also shipped to the Vulcan Iron Works, of Chicago, and to the Sterns Mfg. Co., of Erie, Pa.

The Tyrone Forges, near Tyrone, Blair County, are now operated by Messrs. M. V. Smith & Co. Since January 1 of this year they have added to the forge two double puddling furnaces, one regenerative gas-heating furnace, and one 16-inch train of rolls. Their product will be fine iron exclusively, intended for carriage axles, cable rods, &c., and the daily capacity will be 30 net tons.

The Wharton Safety Railroad Switch Co., of Philadelphia, are gradually removing their works to Jenkintown, where the entire establishment is to be finally located. At the latter place about 150 men are employed, while more than 400 are employed in Philadelphia. It is said that the removal will effect a saving of 90 cents a ton in freight for the delivery of all material, and from \$15,000 to \$20,000 annually in taxes.

The Chartiers Glass Works, on the Lake Erie Railroad, have been sold to S. S. Shultz for \$500.

## OHIO.

It is understood that the contracts for building the Kelly rail mill were all let last week. The Messrs. Kelly state that the enterprise has reached a point of assured certainty, and the work will be pushed forward to completion as rapidly as possible. The contracts, we learn, were awarded to some three or four parties, with a view to securing the completion of all the work at the earliest moment by dividing it. It is estimated that the machinery and other ironwork will be on the grounds inside of six months. Messrs. Lambert Bros., have been awarded the contract for a portion of the

work, which they expect to finish in half that time. The rail factory will have room for 120 nail machines, 60 of which will be put up at the start. The power to drive these machines will be placed in the center of the factory building, which is also the center of the main line of shafting.—*Ironton Register*.

The Champion Co. are now moving their machinery into the new shop, and expect to couple on the new engine the latter part of the week. When completed and fitted up, it will be one of the best arranged and complete shops in the country.—*Springfield Republic*.

The *Cleveland Trade Review* credits the Youngstown *Register* with the statement that "among the recent improvements at the Girard Furnace is a new hot-blast large steam cinder crane air hoist in lowering and raising the bell." A comma or two might be thrown in without injuring the hoist.

It is rumored that Mr. Wm. Garrett, of the Garrett steel wire rod mill, contemplates removing to Beaver Falls, Pa.—a decided loss to Cleveland iron circles.

We have been informed that the contract for furnishing 7000 feet of iron fence to inclose the Woodland Avenue Cemetery, at Cleveland, was recently awarded to the Champion Iron Fence Co., of Kenton.

## ILLINOIS.

Mr. John C. Lamb, of Springfield, has nearly doubled the capacity of his works by making them one story higher and adding an extension 30 x 85, containing a new office and many other improvements.

Referring to the relations existing between the Springfield Iron Co., of Springfield, and the Amalgamated Association, it may be of interest to our readers to know that the company recently sent an agent to Pittsburgh, the headquarters of the above association, in order to advertise for men. The step proved successful, and every department of their works is now in operation with non-union men. Everything, it appears, is moving along satisfactorily, and the company contemplate putting the men on double turn. The successful issue of the Springfield Iron Co.'s movement would appear to be a lesson for both manufacturers and men, and one which may be turned to some account.

All departments of the Calumet Iron and Steel Co.'s works, at Cummings, are running full, except the blast furnace, which is expected to start up the middle of April. The company have now in operation over 100 nail machines, and have lately added to their plant a foundry for the manufacture of steel castings. The steel obtained for this purpose is taken from their open-hearth furnaces, thus insuring castings of a very superior quality. Nine hundred men are employed in the works.

The Chicago Wire and Iron Works, a new concern, have established themselves at 110 Lake street, and are placing in a full line of wire goods, such as bank, store and office railings, and window guards for churches, stores, residences, public buildings, &c. Their store and factory are being fitted up in first-class style, and all the tools, machinery, patterns, &c., of the manufacturing department of the Chicago agency of the Clinton Wire Cloth Co. have been purchased by the first-named concern, together with the goodwill of this branch of their business. Mr. George K. Rix, for many years the superintendent of the Clinton Wire Cloth Co.'s Chicago manufactory, is a manager of the new company, which company will doubtless do a large business in their line.—*Chicago Industrial World*.

The Chicago Steel Works are running on full time with a force of 75 men. They report a fair run of orders, and a good outlook for business in the immediate future.

## INDIANA.

Nine bars of iron lately made by the Ohio Falls Iron Works, of New Albany, for the Louisville Exposition buildings, were tested at Louisville on the 15th inst. The lowest ultimate strength was 54,545 pounds and the highest 62,577 pounds per square inch. The elongation varied from 28 to 32, and the reduction of area from 36 to 42 per cent. These works are now turning out the wrought iron for the above-mentioned buildings.

## MICHIGAN.

The Martel Furnace has been blown out, ostensibly on account of the depression in the iron trade—but there were other reasons, no doubt, which will declare themselves in the near future. The late manager has been called to another field of labor—exactly where it is located the *Journal* is not informed.—*Marquette Mining Journal*.

## MISSOURI.

The American Brake Co. have broken ground for the erection of a machine shop in St. Louis. The shop will have a frontage of 75 feet and a depth of 130 feet, and will be filled with all the latest and best improved machinery. Their capacity will be enlarged to the extent of ten sets of brakes per day, and their present working force of 30 men will be considerably increased. The company have had suit brought against them by the Westinghouse Co., the complainant alleging an infringement of the George Westinghouse locomotive brake patents. An injunction is asked for damages to be afterward determined. The American Brake Co. manufacture three different kinds of locomotive brakes, only one of which (the Randolph driver brake) is involved in the controversy, and this one not very extensively, as only nineteen of them have thus far been turned out. The American Brake Co. seem to think that the filing of the suit was for no other purpose than to frighten away their customers, and thereby prevent their brakes from becoming more generally known. They propose to fight the suit and to protect the buyers of the Randolph brake.

The St. Louis Furnace Building and Construction Co. have just completed the work of lining the Jupiter Furnace of the St. Louis Ore and Steel Co.'s works, and are now lining Furnace No. 3 at the same works.

The Groom Shovel Co. are turning out an average of 75 dozen shovels per day, and are behind orders.

## Boiler Explosions in 1882.

According to figures recently published in the *Locomotive*, there were 172 boiler explosions in the United States during the year 1882, resulting in the death of 271 persons and the injury of 369. This list, however, does not include every accident, but only those reported in the papers. The explosions, as stated in our contemporary, amount to only .11 of 1 per cent. of the whole number of boilers in use, but even this small number is larger than it should be. A classified list of the total number of explosions is as follows:

Saw-mills and wood-working establishments.....	50
Steam vessels generally.....	24
Iron works, machine shops, &c.....	18
Locomotives.....	74
Portable hoists and agricultural engines.....	9
Flour mills and elevators.....	8
Steam-heating buildings, ranges, &c.....	8
Paper-mills, bleaching, digesting, &c.....	7
Distilleries, sugar-houses, chemical works, &c.....	4
Mines, oil wells, &c.....	10
Miscellaneous.....	20

Total for the year.....172

Out of 25,742 visits of inspection, in which 55,679 boilers were examined and 21,428 complete internal inspections were made, and in 4564 cases the hydrostatic test was applied, the number of boilers condemned were 478; the number of defects found were 33,690, of which 6867 were considered dangerous. The number of defects found is as follows:

Nature of defects.	Whole number.	Dangerous.
Deposits of sediment.....	3,438	467
Incrustation and scale.....	4,913	490
Internal grooving.....	2,127	119
Internal corrosion.....	1,210	932
External corrosion.....	1,801	417
Defective braces and stays.....	613	293
Defective settings.....	915	158
Furnaces out of shape.....	1,035	304
Fractured plates.....	1,801	902
Burned plates.....	1,084	485
Blistered plates.....	2,851	85
Defective riveting.....	4,507	535
Defective heads.....	385	142
Serious leakage around tubes.....	3,414	845
Serious leakage at seams.....	1,967	344
Defective water gauges.....	649	145
Defective blow-offs.....	290	113
Low water.....	111	84
Overloaded safety valves.....	358	136
Defective safety valves.....	238	99
Defective pressure gauges.....	838	244
No pressure gauges.....	43	14
Defective feed-pipes.....	1	1
Unclassified dangerous defects.....	1	2
Total.....	33,690	6,867

## TRADE PUBLICATIONS.

## The "Otto" Silent Gas Engine.

Messrs. Schleicher, Schumm & Co., of Philadelphia, Pa., manufacturers of the "Otto" silent gas engine, have just sent us a pamphlet giving instructions for setting up and working this engine. It embraces 15 pages, and is handsomely illustrated throughout, the engravings showing the different important parts of the engine, while the reading matter submitted is of a nature calculated to give the reader a clear idea of its action. The erection of the engine, the pipe connections for the gas supply, gas meter, exhaust pipe, &c., are all dwelt upon in turn, and we do not doubt that users of the "Otto" engine will find the catalogue a most convenient and serviceable adjunct.

## Phosphor-Bronze.

The Phosphor Smelting Co., Limited, of Philadelphia, Pa., have just issued two very neat circulars giving some valuable hints concerning phosphor-bronze. They call special attention to the merits of what is known as Phosphor-Bronze S' Bearing Metal, which is being very extensively used in locomotives, passenger and freight cars, marine and stationary engines and miscellaneous machinery, being applied to bearings, slide-valves, &c. They state further that the experience of some years has proved the reliability and value of phosphor-bronze for telephone wire, and they recommend it as possessing all the qualities essential for durable line service. A recent improvement is said to have been effected in its manufacture, by means of which the tendency to kink is entirely obviated, and the wire will now give no difficulty from this cause. It can also be put up with the same facility as other wire. The circulars also enumerate the various advantages of phosphor-bronze telephone wire, and submit a list of standard sizes that are now being turned out by them. The company, we understand, are the sole manufacturers of phosphor-bronze in the United States, and we do not doubt that some attention given to their manufactures will be of interest.

**Size and Distribution of Rivets.**—The best size of rivets, the distance between them, and the proper amount of lap of the plates, can be determined only by long practical experience, aided by experiments. Fairbairn gives the following table as the results of his information upon this important subject, the proportions given being such as to make the joints steam or water tight:

Thickness of plate in inches.	Diameter of rivets in inches.	Length of rivets from head in inches.	Distance of rivets from center to center in inches.	Amount of lap in single joints in inches.	Amount of lap in double joints in inches.
t.	d.	l.	a.	b.	c.
3-16 to 4-16	3/16	4 1/2	4	6	1 1/2
5-16	3/8	4 1/2	5	6	1 1/2
6-16	3/8	4 1/2	5	5 1/2	8 1/2
8-16 to 12-16	1/2	4 1/2	4	4 1/2	6 1/2

The new freight yards at Weehawken are about as complete as anything that has been done in this part of the country. There are 10 docks varying from 150 to 250 feet in width, most of them nearly 1200 feet long. There are six ferry slips, milk station, grain elevators, and an immense stockyard, with separate docks. Two of the tracks are devoted to coal, and are connected with the main tracks by an elevated road. The freight yard is very capacious, and has an immense number of tracks. This is said to be the most complete and gilt-edged freight terminal that has yet been built.











It is a long time since we have seen a more satisfactory or useful catalogue than that just issued by the A. F. Shapleigh & Cantwell Hardware Co., of St. Louis. It is a large volume of 1028 pages, 9 1/2 by 12 inches, and contains a complete line of General Hardware goods, very fully and satisfactorily illustrated, and in almost every case accompanied by price lists. In fact, Door Locks is the only important line of goods in which the prices are left blank. It is divided into four departments, of which Mechanics and Edge Tools occupy from page 3 to 208; Builders' Hardware, from page 209 to 658; Cutlery, Pocket and Table, Shears, &c., page 659 to 738; and Miscellaneous Hardware, Agricultural Tools, Guns and Revolvers, from page 739 to 1028. In paper, printing, binding, illustrations and all the details of mechanical execution, this book is as good as could be desired, and can not fail to prove of great value to every Hardware man who may have a copy. It is sold for \$10, or a copy will be sent free to any merchant ordering \$100 worth of Shelf Hardware. See advertisement on page 23.

The Cincinnati Stamping Co. have issued a catalogue of 120 pages, giving price list and illustrations of their manufactures, viz.: Japanned Ware, Plain Tinware, Plain and Retinned Deep Stamped Ware, Stamped Tinners' Trimmings, Tinners' Assortment Trimmings, Tinners' Stock, Spoons, and 14 pages of miscellaneous goods. We call the attention of our readers to the Adjustable Window Screen advertised on page 32, and which is made by Edwin Louderback & Co., No. 413 South Fifth street, Philadelphia. The frames of the Screen are so made as to permit an extension of 2 1/2 inches on each side, so as to fit the groove of any window to which the Screen approximates. The frames are of black walnut and the wire-cloth is well stretched and secured. They are made in sizes ranging from 22 inches to 43 inches in length, closed, each size having 5 inches of extension.

### IRON.

**American Pig.**—Dullness is the characteristic feature of the whole Iron market this week. Transactions are very few, and a feeling of caution and a distrust of the future prevent buyers from anticipating their wants, and they are consequently contracting for future delivery even less than last week. This is true of favorite brands, while, of course, it applies with greater force to those less sought for, which are sold with difficulty, and ordinarily by concessions in price. We still quote for Standard brands Foundry No. 1, \$24; Foundry No. 2, \$22; Gray Forge, \$19.50 @ \$20.50.

**Scotch Pig.**—The stock on hand, while moderate, is quite equal to the demand, which is far from large. Arrivals go very generally into consumption on previous purchase. We quote Eglinton, \$22 from yard; Carabro, \$22 from ship; Glengarnock, \$22 @ \$23 from ship and yard; Dalmeilong, \$21 @ \$22 from ship and yard; Summerlee, \$24.50 from ship; Coltness, \$24.50 @ \$24.75 from ship; Gartsherrie, \$25 from yard; Langloan, \$24.50 from ship.

**Bar Iron.**—Nothing of importance has transpired since our last report. There has been a fair trade in small lots, and the market is, if anything, somewhat stronger. A slight improvement in consumption is noted, and inquiries for heavy orders are gradually becoming more numerous. Prices for refined iron at the mills are firmer, and manufacturers decline to receive orders for large lots at present prices, except for immediate delivery. Altogether, the position of the market is thought to be much more favorable than it was a few weeks ago. We repeat last week's quotations. Refined Bars, at the mills, \$2.10 @ \$2.20 and \$2 for Common; from store, \$2.40 @ \$2.50 for Refined and \$2.20 @ \$2.30 for Common.

**Steel Rails.**—The week has not been marked by anything noteworthy. Sales are made in moderate quantities at \$39 at Eastern mills, at which price we hear of the sale of 5000 tons.

**Old Rails.**—We hear of no transactions, and quote, nominally, \$23 @ \$24.50 for T's, according to section, quality, delivery, &c.

**Scrap Iron.**—The market continues quiet and unchanged. There is little or no demand for yard Scrap, which is quoted at \$20.50 @ \$27; ex-store is held at \$26, and ex-ship at \$25, but buyers are not disposed to meet the prices asked.

### METALS.

**Copper.**—There are rumors that, including what we mentioned in our last, some 5000 tons, all told, have of late been taken of Lake Copper for export at 16¢ and less, but it is difficult to get at the truth. Whatever may have been done in this way, however, it certainly has not strengthened our market, which has become more demoralized than ever, manufacturers being apparently determined not to buy a pound of Copper beyond absolute immediate requirements, being under the impression that they will lose nothing by temporizing. Hence, not over 100,000 lb. were sold that we hear of, the closing quotations being for Lake Superior, 17 1/2¢ @ 17 3/4¢; "Anchor" brand, 16 1/2¢; "Star" brand, 16 1/2¢, and Baltimore, 15 1/2¢ @ 15 3/4¢. London yesterday came unaltered—£71 Best Selected, and £66 Chili Bars. To-day we are called from there to the following effect: "Light business during the week, market closing quiet, with prices steady. Best Selected, £70. 10/ @ £71. 10/; and Chili Bars, £65. 5/ @ £65. 10/." Manufacturers have made no change in prices. They quote bottoms, 31¢

@ 32¢; Braziers', 30¢ @ 36¢; Circles, 31¢ @ 36¢; Sheathing, 28¢, and Bolt Copper, 30¢; Segment Sheets, 33¢; Fire-Box, do., 30¢.

**Tin.**—The market has been moderately active at 21 1/4¢ @ 22¢ large lines Straits, and 22 1/4¢ Lamb and Flag. London wired Straits last night £97, while to-day we hear that business continues moderate and prices firm. Straits Ingot, spot, £97 @ £97. 10/; and futures, £97. 15/ @ £98.

IMPORT INTO THE UNITED STATES.  
(First 7 months of fiscal year.)

	1882.	Value.
Cwts.	144,051	\$3,820,265
Re-export.....	532	14,430
Net import.....	143,519	\$3,805,835
Or tons.....	7,176	
Cwts.	103,017	\$2,550,468
Re-export.....	24,531	\$59,626
Net import.....	78,486	\$1,990,842
Or tons.....	4,181	

**Tin Plates.**—Have been very quiet, closing at the quotations below, for ordinary brands, large lines, 7 box: Charcoal Bright, \$5.87 1/2 @ \$6.12 1/2; do. Termes, \$5.25 @ \$5.37 1/2; Coke Tin, \$5.12 1/2 @ \$5.37 1/2, and do. Termes, \$4.87 1/2 @ \$5.00. There was a rumor to-day that a clerical error in the section relating to Tin Plates, which has been discovered, will leave the duty as it was in the old tariff. Liverpool was quite strong yesterday—Coke at 16/ @ 16/6, and Charcoal, 18/ @ 21/. We are told per cable to-day from London that a small business is doing and that quotations are nominal.

IMPORT INTO THE UNITED STATES.  
(First 7 months of fiscal year.)

	1882.	Value.
Cwts.	2,545,191	\$10,380,356
Re-export.....	5,509	24,495
Net import.....	2,539,682	\$10,355,861
Tons.....	120,995	
Cwts.	2,266,591	\$9,404,151
Re-export.....	3,222	14,654
Net import.....	2,263,369	\$9,389,497
Tons.....	114,669	

**Lead.**—Quite a change has again occurred in the Lead market, 500 tons Common Domestic having sold at 4 1/2¢, while for Corroding Lead a bid of \$4.60 cannot be obtained. St. Louis is 4 1/2¢ for both Hard and Soft. The outlook, for the moment, has become quite gloomy once more, so that, in the present disposition of the trade, the market may drop off another fraction any day. The enormous production going on and the little confidence which the metal inspires bode no good as regards values in this market. The sooner, therefore, the drop occurs, the better it will be, for consumers will then be encouraged to come forward resolutely. From London we are cabled to the following effect: "Lead is quiet and unchanged; Common English Pig, £13. 10/ @ £13. 15/." Manufacturers are quoted as follows: Lead Pipe, 6 1/2¢; Sheet Lead, 7 1/2¢; Tin-lined Lead Pipe, 15¢ @ 16¢, and Block-Tin Pipe, 45¢, less the usual discount to dealers.

**Spelter and Zinc.**—The reviving demand has continued, a good business being done on the basis of \$4.80 for Common Domestic, while Silesian is nominally held at 5 1/4¢. We are cabled from London this afternoon as under: "The market is dull and prices weaker; ordinary, at shipping ports, £15. 5/ @ £15. 10/." We quote Bertha Refined 8 1/2¢ and Bergenport 9 1/2¢, while Sheet Zinc is firm at 6 1/4¢ @ 6 3/4¢.

IMPORT INTO THE UNITED STATES.  
(First Seven Months of Fiscal Year.)

	1882.	Value.
Pounds.	12,835,158	\$504,527
Re-export, sheet zinc.....	1,265,094	84,664
Total.....	11,570,064	\$419,863
Net import.....	11,570,064	\$419,863
Or tons.....	6,588	

**Antimony.**—A moderate jobbing demand has prevailed at 10¢ @ 10 1/4¢ for Hallett, and 11¢ @ 11 1/4¢ for Cookson.

**Old Metals, Paper Stock, &c.**

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	10 1/2¢	10 1/2¢
Copper, light.....	10 1/4¢	10 1/4¢
Copper Bottoms.....	10 1/4¢	10 1/4¢
Yellow Metal.....	10 1/4¢	10 1/4¢
Brass, heavy.....	10 1/4¢	10 1/4¢
Brass, light.....	10 1/4¢	10 1/4¢
Composition, heavy.....	10 1/4¢	10 1/4¢
Lead, heavy.....	10 1/4¢	10 1/4¢
Tea Lead.....	10 1/4¢	10 1/4¢
Zinc.....	10 1/4¢	10 1/4¢
Pewter, No. 1.....	10 1/4¢	10 1/4¢
Pewter, No. 2.....	10 1/4¢	10 1/4¢
Wrought Iron.....	10 1/4¢	10 1/4¢
Light.....	10 1/4¢	10 1/4¢
Stove Plate.....	10 1/4¢	10 1/4¢
Machinery.....	10 1/4¢	10 1/4¢
Grate Bars.....	10 1/4¢	10 1/4¢
Electrotype Plates.....	10 1/4¢	10 1/4¢
Small type.....	10 1/4¢	10 1/4¢

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen.....	10 1/4¢	10 1/4¢
White Cotton, Sew.....	10 1/4¢	10 1/4¢
White, No. 1.....	10 1/4¢	10 1/4¢
White, No. 2.....	10 1/4¢	10 1/4¢
Second.....	10 1/4¢	10 1/4¢
Soft Woollens.....	10 1/4¢	10 1/4¢
Mixed Rags.....	10 1/4¢	10 1/4¢
Gunny Bagging.....	10 1/4¢	10 1/4¢
Butts.....	10 1/4¢	10 1/4¢
Kentucky Bagging.....	10 1/4¢	10 1/4¢
Book Stock.....	10 1/4¢	10 1/4¢
Newspapers.....	10 1/4¢	10 1/4¢
Waste Paper and Scraps.....	10 1/4¢	10 1/4¢
Kentucky Bale Rope.....	10 1/4¢	10 1/4¢

### COAL.

In the Anthracite Coal trade the market shows little, if any, improvement compared with last week. Dealers are not "stocking up," and the reason given is that they are disappointed by the spring opening prices. There is, however, a fair trade in progress. The Delaware, Lackawanna and Western

Co.'s circular, issued on Saturday, makes the price of Scranton at Hoboken 10¢ 3/4 ton higher for Egg and Chestnut, compared with last year, other sizes remaining unchanged. It is well understood that actual sales by all the producing companies, with rare exceptions, are 10¢ @ 15¢ below the circulars, the variations depending on quantity and the size which it is most convenient to deliver. Respecting mining operations, the chances are that there will be a stoppage of six days in every month between now and August 1st, but nothing is yet positively determined.

Eastern trade is quite brisk, with freight \$1 to Boston and 75¢ to Providence. Bituminous continues very dull at about \$4.50 @ \$4.75.

The total Anthracite product last week was 450,823 tons, which is, as compared with the same week last year, an increase of 58,948 tons. The product for the year so far is 4,492,570 tons, an increase of 411,160 tons.

The Pennsylvania Railroad Co. are fast extending their tracks up the valley of the Schuylkill, on both sides of the river, into the Anthracite Coal regions.

### EXPORTS.

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending March 27, 1883.

	Quant.	Val.
Hamburg.		
Pm. gals. 1,387,445	\$114,968	
Rifles, case.....	210	
Clocks, pkgs.....	46	4,495
Hdw., pkgs.....	21	730
Firearms, case.....	1	230
Ag. imp. pkgs 412	7,447	
Clocks, pkgs.....	13	427
Sew. ma., case.....	826	15,908
Mach'y, pkgs.....	5	346
Mf. iron, pkgs.....	1	1,462

Dutch East Indies.

Pm. gals. 549,500	61,660	
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Rotterdam.

Pumps, pkgs.....	57	1,773
Hdw., pkgs.....	13	715
Scissors, case.....	1	94
Copper, case.....	1	3,550
Wringers, case.....	30	1,230

Bremen.

Pm. gals. 1,535,254	192,285	
Ag. imp. pkgs 43	1,724	
Rifles, case.....	3	200
Ag. press, pkgs.....	1	1,920
Mf. iron, pkgs.....	8	800
Hdw., pkgs.....	47	1,754

Liverpool.

Bells, case.....	1	40
Mf. iron, pkgs.....	3	42
Wrenches, case.....	6	187
Cotton gins, case.....	2	121
White met., case.....	6	450
Ag. imp. pkgs.....	1	1,800
Scissors, case.....	1	180
Clocks, pkgs.....	7,500	3,500
Pistols, case.....	2	600
Hdw., pkgs.....	45	1,665
Mach'y, pkgs.....	1	1,665
Sew. ma., case.....	10	164
Saws, case.....	8	36

Hull.

Pumps, pkgs.....	12	719
Hdw., pkgs.....	16	617
Mf. iron, pkgs.....	3	100
B. comp. pkgs.....	25	300
Ag. imp. pkgs 242	9,138	
S'p'dw re, case.....	1	138
Scissors, case.....	31	244
W. mlls, pkgs.....	3	150

Bristol.

Mf. iron, pkgs.....	3	115
Ag. imp. pkgs 562	9,900	

London.

Ag. imp. pkgs 24	2,306	
Clocks, pkgs.....	269	9,773
Revolvers, case.....	4	1,791
Pm. gals. 726,767	67,940	
Hdw., pkgs.....	275	6,775
Pumps, pkgs.....	7	479
Sew. ma., case.....	251	7,175
Cutlery, case.....	5	47
Iron safe.....	1	380
Light rods, case.....	8	276
Mach'y, pkgs.....	127	44,436
Iron tanks.....	4	100

Kaustrop.

Pm. gals. 198,407	16,870	
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Elisnore.

Pm. gals. 338,100	25,565	
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Antwerp.

Sew. ma., case.....	35	1,114
Tacks, case.....	5	5
Pm. gals. 46,100	38,490	
Clocks, pkgs.....	4	47
Hdw., pkgs.....	70	1,411
Guns, case.....	1	508
Ag. imp. pkgs 47	2,301	

Glasgow.

Hdw., pkgs.....	15	241
Mach'y, pkgs.....	15	3,973
Ag. imp. pkgs 21	276	
Sew. ma., case.....	98	1,974

Newcastle.

Ag. imp. pkgs 22	800	
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Exmouth.

Pm. gals. 117,309	9,376	
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Leith.

Hdw., pkgs.....	4	380
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Canada.

Guns, case.....	1	157
Spigiron, vns.....	19	250

Newfoundland.

Hdw., pkgs.....	1	44
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New Scotia.

Pm. gals. 27,500	380	
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New Brunswick.

Pm. gals. 21,000	375	
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British Guiana.

Pm. gals. 1,000	650	
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British Possessions in Africa.

Pm. gals. 65,500	8,198	
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Peru.

Ag. imp. pkgs 194	2,304	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.

Mf. iron, pkgs.....	886	7,102
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Luquillo.

Pm. gals. 450,000	39,000	
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United States of Columbia.



general as a few weeks ago. Small lots command full quoted rates, but for a good-sized order, with desirable specifications, there is still plenty of competition. The mills appear to be moderately well employed, but there are very few who have orders to run more than three or four weeks, so that a good deal depends on the current demand being well maintained. Sales have been made at from 2.25¢ to 2.3¢ for best Refined Iron, down to about 2¢ for ordinary qualities. Skelp Iron nominal at about 2.25¢ for Grooved and 2.5¢ for Sheared.

**Plate and Tank Iron.**—A moderate amount of business has been done in small lots, but there is no particular change of feature. Manufacturers keep a sharp lookout for new business, and until a larger amount of orders are on the books than there are at present, prices can hardly be expected to improve. One or two good-sized lots (say, 500 to 700 tons in all) of Boat Plate will probably be taken during the week, beyond which there is very little inquiry. Prices are about 2.5¢ for ordinary grades, 3.4¢ @ 3.5¢ for Shell Iron and 4.25¢ @ 4.5¢ for Flange.

**Structural Iron.**—The market is very dull, and the mills have barely held their own during the past week. There are a few orders likely to be placed at an early date, but the immediate outlook is not specially encouraging. Prices are unchanged—say, 2.5¢ for Angles, 3.2¢ for Tees and 3.5¢ for Beams and Channels.

**Sheet Iron.**—The market is somewhat irregular, and, on the whole, rather unfavorable to manufacturers. Some have been able to market their entire output since the first of the year; others have accumulated stock and are anxious to secure orders, although prices may have to be shaded a little. For small lots quotations are about as follows, but buyers of large lots can obtain moderate concessions:

Common Sheets, No. 28.....4.4¢  
Common Sheets, Nos. 26 and 27.....4.4¢  
Common Sheets, No. 24 to 25.....4.4¢  
Common Sheets, No. 16 to 21.....3.4¢  
Best Refined 1/4" advance on the above.  
Best Bloom Sheets, No. 26 to 28.....7.6¢  
Best Bloom Sheets, No. 22 to 25.....6.5¢  
Best Bloom Sheets, No. 16 to 21.....6.5¢  
Common Red Plates, 1/16 to 1/8.....3.1¢  
Blue Annealed, 1/16 to 1/8.....3.1¢  
Best Bloom, Galvanized, discount.....3.5¢  
Second quality, discount.....4.5¢

**Steel Rails.**—The market is very quiet, and but few sales have been made for some time past. There are buyers at about \$38, but in the meantime manufacturers quote \$39 @ \$40, according to quantity, section of rail, time of delivery and location of mill.

**Crop Ends.**—Several sales have been made during the week, in all probably 2500 tons, part Bloom Ends. Prices realized were from \$21.75, at tide, to \$23, market closing firm at \$22.50 @ \$23.

**Iron Rails.**—There is some inquiry for Light Rails for Southern roads, but we have not heard of any sales being made. A 4000-ton lot of 56-lb Welsh Rails, which have been in store in New York for a long time, were sold at \$28, and afterward resold to a Florida company. Inasmuch as the last sale was part exchange, quotations cannot be given definitely.

**Old Rails.**—A few hundred tons Double Heads sold at \$27.50, and small lots T's, spot, at \$25 @ \$25.50. Shipments offered at \$23 @ \$24 without attracting attention.

**Scrap Iron.**—Cargo lots, \$25 @ \$26; selected yard lots, \$26.50 @ \$27.50. Market dull.

**Wrought Iron Pipe.**—Demand still continues light, with prices weak at about previous quotations, viz.: Boiler Tubes 55¢ and Steam and Gas Pipe 67 1/2¢ @ 70¢ off list price.

**Nails.**—Have not been in active request, and are called for principally in small lots. Prices are irregular and may be nominally quoted at about \$3.15 @ \$3.20 per keg.

## PITTSBURGH.

(Special Dispatch to The Iron Age.)

Pittsburgh, March 28, 1883.

At an adjourned meeting of the Western Nail Association, held in Pittsburgh, the following preamble and resolution was adopted:

Whereas, The reports from the Nail manufacturers generally indicate that the demand is taking up the Nails as fast as made; and

Whereas, It is desirable that the manufacturers may have an opportunity, if possible, to accumulate a stock to enable them to fill orders promptly; therefore, be it

Resolved, That the stoppage provided at the last meeting be postponed two weeks.

This permits the mills to run until April 21st. There seems to be a great scarcity of Nails in the hands of mills and jobbers, and stocks are very much broken. This action was deemed necessary to enable the mills to sort up and accumulate stocks with which to fill orders.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., March 27, 1883.

The weather during the past week has been very unfavorable for the growing crops, the mercury during the greater part of the time being below freezing. General business has not improved much in consequence. Our manufacturers are discouraged. Not only is the situation at present unsatisfactory, but the outlook for the future is not encouraging. Making due allowance for exaggeration, there is no doubt that the winter wheat crop has been badly damaged in some localities. The crop and weather reports are being scanned very closely by our manufacturers, who are well aware that without good crops the market for manufactured goods must of necessity be very much curtailed. Pittsburgh is dependent mainly upon the great West and South for a market for her products, and unless those sections have good crops, she is certain to suffer.

**Ore.**—The situation remains unchanged, as compared with that of a week ago. Consumers are still buying only to supply immediate wants. They are not sure that prices have reached the lowest point, and it is evidently their intention to keep themselves in position to take advantage of a further decline. The Lake Ore companies desire to have it understood, however, that rather than sell their

Ore at cost or a loss they will stop mining. It is evidently their intention to gauge the production by the consumption, and thereby prevent an accumulation, as was the case last year.

**Pig Iron.**—Business has been less active the past week. Apparently, there is less disposition to anticipate future wants than there was a month ago. Owing to the backwardness of the season, orders for finished goods are not coming forward very freely. Mill owners are buying the raw article only as their immediate wants require, notwithstanding they do not expect it to rule much, if any, below present prices. In two important respects the situation is favorable to the furnaces—one is the reduced production, the other an increased consumption. The consumption here has been increased considerably within the past few weeks, while scarcely a week passes that we do not hear of one or more furnaces blowing out. It is also worthy of mention that the stock in first hands west of the mountains is not nearly so large as was supposed, and it will no doubt be the policy of the Western Pig Iron Association to keep the production down to the lowest possible limit until there is a decided change for the better. It appears to be generally admitted that the cost of production has been reduced to the lowest possible limit, and that the margin for profit at present prices is small. Any further attempt to bear the market will therefore be resisted by blowing out. We repeat former quotations:

No. 1 Foundry.....\$32.50 @ \$33.00, 4 mos.  
No. 2 ".....30.00 @ 31.00, 4 " "  
Gray Forge Neutral.....19.00 @ 20.00, 4 " "  
White and Mottled.....18.00 @ 19.00, 4 " "  
Bessemer Iron.....22.00 @ 23.00, 4 " "  
Cold-Blast Charcoal.....32.00 @ 35.00, 4 " "

**Muck Bar.**—There have been no sales since our last report, in the absence of which we quote, nominally, at \$34 @ \$35, cash, at mill. There is not much offering, but it is because sellers know that it is useless unless at a price below cost; besides, mill men generally prefer to make their own Muck Bar.

**Manufactured Iron.**—Manufacturers generally report but little change in the situation during the week, and while dissatisfied with the present, they are hopeful as to the future. Stocks in hands of large consumers and jobbers are unusually light, and just as soon as they commence to buy with any freedom the mills will have about all they can do. We continue to quote prices on a basis of 2¢ for Bars, 60 days, 2 1/2¢ off for cash.

**Nails.**—At Chicago, Milwaukee, St. Louis and other points of distribution at the West, prices are being cut more or less, caused by an attempt of Eastern makers to get a foothold in those markets, and this the Western manufacturers are determined to resist. Business continues dull, and unless there is a very decided change for the better in the meantime, there will be another stop of two weeks made next month. Prices are still quoted at \$3.40, 60 days, 2 1/2¢ off for cash, with usual abatement of 10¢ per keg on carload lots and upward.

**Wrought Iron Pipe.**—Trade is still reported slow—unusually so for this season of the year—but a change for the better is looked for within the next week or two. Prices remain unchanged: Discount on Gas and Steam Pipe 70¢ @ 75¢; on Boiler Tubes, 55¢ off. Oil-Well Casing, 50¢ per foot, net; do. Tubing, 15¢ @ 16¢.

**Old Rails.**—It is difficult to quote American Tees, as there are but few selling. The last sale reported was at \$26, and for immediate delivery they cannot, so far as we can learn, be laid down here from any point East or West below the price above quoted. Contracts for delivery during the summer months, sellers' option, could be made at \$25, possibly, but consumers here are refusing to make contracts for future delivery. The offerings for immediate delivery are light.

**Steel Rails.**—Heavy Sections for near-by delivery are still quoted at \$40, cash, at mill. The mills are pretty well supplied with orders, having enough booked to absorb their production for several months.

**Steel.**—The Merchant Steel trade continues quiet, with no recent change in prices.

**Railway Track Supplies.**—There is a very fair business in Spikes, but under the influence of a strong competition prices are lower. We now quote at 2.60¢, 30 days; Splice Bars, 2¢ @ 2.10¢; Track Bolts, 3.25¢ with Square and 3.35¢ @ 3.40¢ with Hexagon Nuts.

**Crop Ends.**—There have been no sales reported for so long that we omit quotations. The market is firmer, however, and higher prices in the near future are looked for.

**Scrap.**—There is but little doing, and prices for the most part are nominal. No. 1 Wrought is quoted at \$25 per net ton for Ordinary, and \$26 @ \$27 for Selected; Wrought Turnings, \$17 @ \$19; Old Car Axles, \$35 @ \$36; Old Car Wheels, \$23, gross; Cast Boring, \$13 @ \$14.

**Coke.**—Business continues unsatisfactory, although all that can be expected, in view of the depressed condition of the Pig Iron trade, with so many furnaces out of blast. Prices unchanged—\$1.05 per ton, delivered free on cars at ovens.

**Window Glass.**—This important interest continues very unsatisfactory. Not only is business light, but prices are unremunerative. Discounts are still quoted at 70¢ on Single and 75¢ on Double Strength, in carload lots.

**Petroleum.**—Has again taken a sharp turn backward, and while the bears are elated, the bulls are correspondingly depressed. Within the past week there has been a decline of 15¢ @ 17¢ per barrel.

## CHICAGO.

Office of The Iron Age, 36 and 38 Clarke St., cor. Lake, Chicago, March 26, 1883.

**Hardware.**—The demand for Shelf and Heavy Hardware continues active; prices remain unchanged.

**Nails.**—The demand is fair; rod, to 60d. are now quoted at \$3.30 @ \$3.40 per keg, with the usual discount for cash.

**Manufactured Iron.**—The demand for Merchant Bar continues to be good, and quotations remain unchanged as follows:

Bar Iron, 2.30¢ @ 2.40¢ rates; Angle Iron, 3.10¢ @ 3.30¢ rates; T Iron, 4¢ rates; Beams, 3.80¢; Channels, 3¢; Tank Iron, 3¢ @ 3.20¢ rates; Sheet Iron, 3.20¢ @ 3.40¢ rates; Norway Original Bars, 4 1/2¢ rates; Norway Re-rolled Bars, 5 1/2¢ rates; Ulster, 4 1/2¢ rates; Low Moor Iron, 8¢ rates; Nuts and Washers, 8¢ off list; Wrought Boat Spikes, 3 1/4¢ rates.

**Pig Iron.**—Southern Coke continues firm and the demand is good. Lake Superior Charcoal and Imported Scotch Irons have a tendency to weakness, but we have as yet no change to note in quotations. We quote Charcoal Pig, Nos. 1 and 2, \$24; No. 3, \$25, and Nos. 4, 5 and 6, \$26.50, 4 months; Briar Hill, \$25; Silvery Soft, \$23 @ \$24; Crane No. 1, \$27.50; No. 2, \$26.50; Himrod, \$24; Thomas, \$27.50 @ \$28; American Scotch, \$24 @ \$25; Du Val, No. 1, \$24; No. 2, \$23; Fulton Notch, No. 2, \$22.50; No. 3, \$21.50. Imported Scotch, \$31 per ton, cash. Southern Coke, \$25.50. Calumet, \$23 @ \$23.50, 4 months. Imported Scotch, \$31.50.

**Steel.**—A slight improvement is to be noted in the market for Steel; prices remain, however, without change. We quote as follows: Tool, 12¢; Machinery O. H., 5¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6¢; over O. H. Spring, Tire and Sleigh Shoe, 5¢; Sheet, first, second and third quality, 12¢, 10 1/2¢ and 8 1/2¢ respectively; Crucible Plow, 6¢; Eagle Plow, 5¢; Iron Center Plow, 9 1/4¢; and Soft Steel Center Plow, 9 1/4¢; Cast Plow, 5¢; German Plow, 4 1/2¢.

**Scrap Iron.**—The inquiry is fair, with few sales. The following are the purchasing prices paid by dealers: No. 1 Railroad Wrought Scrap, 1/2 net ton, \$22; No. 1 Country Wrought Scrap, 1/2 net ton, \$20; No. 1 Cast Scrap, 1/2 ton, \$17; No. 1 Stove Plate Scrap, 1/2 ton, \$11; Machine Shop Wrought Turnings, 1/2 ton, \$10; Cast Iron Boring, \$7.

## CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., Chattanooga, March 26, 1883.

General trade in the Southern district has been good for the season during the past week. The weather has been cold, with frosty nights, which have probably seriously injured the fruit crop.

**Pig Iron.**—There is a steadier market than for some time. Furnace managers, making preferred brands, have determined that mean Irons shall not control the market, and have succeeded in establishing, by united effort, something like uniformity of price. Best Foundry grades are scarce. Contracts are being made at full rates for choice lots. We quote: No. 1 Foundry, \$22 @ \$23; No. 2 Foundry, \$20 @ \$21; Gray Forge, \$18 @ \$19; White and Mottled, \$16 @ \$18; Car-wheel Metal, \$28 @ \$30.

**Ores.**—We quote: 50¢ Brown Hematite, 1/2 ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnaces.

**Miscellaneous Articles.**—Old Rails are dull and nominal at \$24, mostly bought on private terms for shipment. We quote Wrought Scrap, \$18 @ \$22; Cast Scrap, \$11 @ \$14; Old Wheels, nominal, \$24.

**Nails.**—Are strong at \$3.40, carload lots at mills, 60 days; 15¢ higher for small bills.

**Manufactured Iron.**—Bar mills continue on double turn, and report satisfactory business. We quote at \$2.40 and steady for large bills; Railroad Spikes, \$3.20; Track Bolts, \$3.75; Fish Plate, \$2.50.

**Coal.**—We quote: Fancy Lump, \$4; Common, \$3 @ \$3.50; run of mine to manufacturers, \$2.

**Coke.**—We quote: Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 12¢ per bushel.

**Steel and Iron Rails.**—A few small lots have been placed for Pennsylvania mills at \$40 at mill. There is no demand here for Iron Bars, and the mill is closed for want of rolling contracts.

## LOUISVILLE.

GEO. H. HULL & CO., Commission Merchants, report to us as follows, under date of March 24, 1883: The market is firmer in tone, and prices on some grades are slightly higher, but sales are curtailed, owing to difference in views between buyers and sellers. We quote, for cash, in round lots, as below:

**FOUNDRY IRON.**  
No. 1 Hanging Rock Charcoal.....\$25.00 @ \$26.00  
No. 1 Southern Charcoal.....22.00 @ 22.50  
No. 1 Hanging Rock Stonecoal and Coke.....21.50 @ 22.00  
No. 1 Southern Stonecoal and Coke.....21.00 @ 21.50  
No. 1 Southern Stonecoal and Coke.....21.00 @ 21.50  
" American Scotch ".....21.00 @ 21.50  
Open Silver-gray.....20.00 @ 20.50  
Close Silver-gray.....19.00 @ 19.50

**MILL IRONS.**  
No. 1 Charcoal.....20.50 @ 21.00  
No. 1 Stonecoal and Coke, Neutral.....19.50 @ 20.00  
No. 1 Stonecoal and Coke, Neutral.....18.50 @ 19.00  
No. 1 Stonecoal and Coke, Cold-short.....18.50 @ 19.00  
White and Mottled, Cold-short and Neutral.....17.00 @ 18.00

**CAR WHEEL IRONS.**  
Hanging Rock, Cold-blast.....30.00 @ 32.00  
Hanging Rock, Warm-blast.....25.00 @ 27.00  
Alabama and Georgia, Warm and Cold-blast.....25.00 @ 28.00  
Central Kentucky, Cold-blast.....25.00 @ 28.00

W. B. BELKNAP & CO., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of March 24, 1883: The demand for Bar Iron is well sustained, and prices, if they have changed at all from last week, are toward a higher plane. Immediate deliveries are difficult to obtain on assorted lots bought at low prices. Should the present depressed prices continue, an effort at readjustment of the labor scale in June is not improbable. Sheet is selling freely at the current low quotations. Concessions are difficult to obtain, and some large lots are looking for spring delivery. The mills are steadily refusing to take orders for summer. Nails are now coming forward freely. Some cutting is indulged in, but not more than might be expected with the market in the condition it is. Choice brands are jobbing here at \$3.40; those classed as inferior, at enough less to make them go. Fence Wire is very active, as are also Plows

and Plow Material. Trade continues satisfactory in volume. Margins, however, are cut as close as we ever knew them.

## CINCINNATI.

MARCH 26, 1883.—Pig Iron.—More inquiry and requisitions have been made in the past week for present and near future uses, and at prices sustaining quotations last week. The demand is for all grades, including the whole line of Forge Irons that has been so neglected in the past two or three months. It is beginning to dawn on consumers throughout the West that the showing by reliable statistical sources that the surplus on March 1, this year, of stocks of American Pig is 250,000 tons less than the same time last year, and that it is very safe to place orders for the season's business. It is thought that the outlook is not upon lower prices—probably the contrary. While there is no special buoyancy in the Iron business in this region, there is good reason for a strong faith in the future.

Best No. 1 Hanging Rock Charcoal Foundry.....\$25.50 @ \$26.00  
Good No. 1 Hanging Rock Charcoal Foundry.....25.00 @ 25.50  
No. 1 Tennessee Charcoal Foundry.....23.00 @ 23.50  
No. 1 Alabama Charcoal Foundry.....21.00 @ 21.50  
No. 2 ".....21.00 @ 21.50  
Best Hanging Rock Coke Foundry.....22.50 @ 23.00  
Best Southern Coke Foundry.....21.00 @ 21.50  
American Scotch.....20.00 @ 20.50  
No. 2.....21.00 @ 21.50  
Silver-Gray Softeners and Fluxers.....21.50 @ 22.00  
No. 2.....21.00 @ 21.50  
Nos. 3 and 4, Close Silvery Soft.....20.00 @ 20.50

Forge Irons, \$19 @ \$24, including all grades from Stonecoal, Coke and Charcoal fuels. Car-wheel Irons.—Cold-blast Charcoal, \$28 @ \$30; Warm-blast, \$26 @ \$27. Scrap Irons.—No sales reported to justify quotations.

## ST. LOUIS.

HOFFER & CO., Pig Iron and Iron Ore Merchants, 417 Pine street, report to us as follows, under date of March 24, 1883: While trade is still very quiet, there is more inquiry, and some increase in sales. Prices remain substantially the same. Quotations are:

**NOT BLAST CHARCOAL IRONS.**  
Missouri.....\$21.00 @ 22.00  
Southern.....22.00 @ 23.00  
Ohio.....21.75 @ 22.75  
**COAL AND COKE IRONS.**  
Missouri.....21.00 @ 22.00  
Southern.....21.75 @ 22.75  
Ohio.....21.00 @ 22.00  
**MILL IRONS.**  
Red Short.....\$19.00 @ 21.00  
Neutral.....19.00 @ 20.00  
**CAR WHEEL AND MALLEABLE IRONS.**  
Missouri.....\$24.00 @ 25.00  
Southern.....25.00 @ 26.00  
Ohio.....25.00 @ 26.00

## BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of March 26, 1883: Both values and trade continue depressed and unremunerative, and it is thought we have now reached a basis on which it can safely be predicated that a healthy advance must soon be encountered when trade improves.

Ref. Bar Iron, 1 to 6 x 1/4 to 1, 1/2 @ 2.35¢  
" 1 to 4 x 1/2 to 1, 1/2 @ 2.35¢  
" 1/2 to 1, 1/2 @ 2.35¢  
" Square, 1/2 to 1, 1/2 @ 2.35¢  
Hoop Iron, 1/2 wide and upward.....3.20 @ 3.30¢  
Band Iron, from 1/2 to 6 in. wide.....2.70 @ 2.80¢  
Home-shoe Iron.....3.40 @ 3.50¢  
Norway Rail Rods.....3.40 @ 3.50¢  
Black Diamond Cast Steel.....11 @ 12¢  
Machinery Steel.....4 1/2 @ 5¢  
Spring Steel.....4 @ 4 1/2¢  
Common Horse Nails.....10 @ 11¢  
Railroad Spikes, 1/2 x 9/16.....2.40 @ 2.75¢  
Parkins' Horse shoes, 1/2 keg of 100 lb.....5.87 1/2¢  
" Mule shoes.....5.87 1/2¢

## RICHMOND.

ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of March 26, 1883: Our Iron market continues quiet and steady. No transactions of especial note. Quotations as below:

No. 1 Scotch Pig Iron.....\$24.00 @ 25.00  
No. 2 Anthracite Pig Iron.....24.00 @ 25.00  
No. 2 ".....23.00 @ 24.00  
No. 1 Virginia Coke Pig Iron.....23.50 @ 24.00  
No. 2 ".....21.00 @ 22.00  
No. 2 ".....18.00 @ 19.00  
White and Mottled.....18.00 @ 19.00  
Virginia C. B. Charcoal.....27.00 @ 28.00  
Old Dom. Nails (carload lots).....3.40 @ 3.50¢  
Old Rails.....23.00 @ 24.00  
Old Wheels.....19.00 @ 20.00  
Wrought Scrap, No. 1.....21.00 @ 22.00  
Cast Scrap, No. 1.....19.00 @ 20.00  
Richmond Refined Bar Iron.....2.40 @ base.  
Horse Shoes (Tredgair).....4.80 @ 5.00¢  
Mule.....5.50 @

## Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., March 12, 1883.

## YOUR NEW TARIFF

has been one of the great themes of conversation and controversy during the past week. Everybody is thoroughly surprised that any such measure should have been passed at all during the late session of Congress, and the feeling of astonishment is heightened by the circumstance that the bill should have been pushed through at the very last moment. People here had read so much about the possibilities of American tariff legislation, and had been so bewildered by the contradictory accounts of the past few months, that they had given the whole thing up as a very bad job, in utter despair of any progress being made against the resistance of your protectionists to all reform. By these the news that the conference committee had arrived at something like an agreement was received with incredulity, and more especially so by those whose knowledge of Washington log-rolling and American political machinery was most thorough. Then there came along the announcement that the tariff bill had really been passed by both houses and promptly signed by President Arthur. This pleased the multitude—tickled the ears of the groundlings, as it were, and made business men glad that the uncertainty had come to an end, even if that end was not what it might have been. Everybody confessed to the belief that to pass the bill was wise, if only to put an end to the uncertainty and hesitation which for so many months past has played the devil with legitimate business in the United States, as well as to some

extent in Europe. Next, however, came the question as to what settlement had been arrived at by the concentrated wisdom of your Senate and House of Representatives. The old tariff dead—what is the new? On this head there was extremely meager information to be obtained. A few private firms had received cables showing the effect of the new duties on their particular manufactures, and the daily papers (with marvelous want of forethought and presence) gave but paragraph scraps touching pig iron and steel rails. Not until Saturday last had we anything approaching an accurate idea as to the changes made, and then through the medium of a long cablegram to the *Ironmonger*. According to that journal's message, there are many reductions on certain classes of goods, but the classifications of the old and new tariffs appear to be so widely different that a fair and correct comparison is impossible. Perhaps next week's mails may bring us more detailed reports, and so do something in the way of satisfying the hunger of the British mind as to what the upshot is likely to be. The appetite for this news is undoubtedly very keen, and has been whetted by the reports that extensive inquiries and some positive orders have been received by our ironmasters during the past week. One such order is alleged to be for 2000 tons of hoop iron, to be delivered over some months of the second half of this year. The inquiries are mostly for sheet and bar iron and wire, with wire rods. The telegrams from your side reporting that certain classes of American manufacturers "declare that the tariff will ruin them," naturally added fuel to the fire, the inference being that their ruin (deemed highly problematical, by-the-by) could only be accomplished by some course of events proportionately beneficial to British manufacturers. Here the matter now rests, those who have most experience being under the impression that the new duties will only lead to increased importations in certain lines of goods which you cannot, or do not, at present manufacture for yourselves, or in raw materials.

The general and trade journals have been full of "leaders" on the new tariff since I last wrote. Most of the dailies recognize in the change a "decided tendency on the part of the American people to throw off the bondage of protectionism (whereby the few benefit at the expense of the many) and adopt an enlightened free-trade policy." Many learned dissertations have been penned on this text, in some quarters the conversion of your people to Golden Rule principles being taken for granted, and the exact date of your reception into the Free Trade League fixed! Some few of the better informed papers are not by any means so over-jubilant, their convictions being that the United States will not throw off protection suddenly or for some time to come, but that it is only a question of time for the desired event to come about. Of the trade journals, I take excerpts, as below, from two of those best known to your readers:

The *Ironmonger* says: "The Democrats accept it as being merely an installment of a reform, which they promise to carry forward as soon as they shall obtain control of the House of Representatives. Any further legislation, however, is doubtful, partly because the Republicans will control the next Senate, and partly because the country would probably prefer the tariff as now amended to another long period of uncertainty. Leaving that point to the future, it is to be noted that while the free traders are dissatisfied, some of the protected interests are already declaring that they are placed in the utmost jeopardy by the revised duties. The hoop-iron, iron-wire and iron-rod manufacturers of Pittsburgh assert that their business will be ruined, and the pig-iron, sheet-iron and steel manufacturers affirm that their trade will be 'greatly crippled.' This outcry is no doubt intentionally exaggerated, chiefly for the purpose of preparing the way for reductions of wages, but also in order that public opinion may be led to oppose the further tariff revision threatened by the Democrats. As the new duties do not come into operation until July 1, there will be ample time in the interval to analyze them and ascertain their probable incidence. It may be found that the practical effects of the tariff on English manufactures may be more favorable than now appears likely, but that can only be ascertained by inquiries which we are not in a position to institute at the moment. Where the duties are reduced we may be certain that the American manufacturers in corresponding industries will strain every nerve to meet the new conditions by reducing wages or in other ways, so that it by no means follows as a matter of course that lower duties must result in increased business for us. The tendency will be in that direction, nevertheless, and our manufacturers will doubtless not be idle in doing their best to utilize the opportunities so afforded to the best possible advantage."

The *Engineer* remarks, *inter alia*: "The protectionists have won an undoubted victory, not perhaps immediately apparent, if judged only by the alterations in the rates, but evident enough if the spirit which has guided the change and the practical result be taken into account together. \* \* \* But while it will be seen from what we have said that the American policy is still strictly protective, signs are not wanting of agitation in another direction. It is difficult to alter a complicated tariff without hurting some existing interests, and discontent so caused is the first condition of reform. American manufacturers in several branches of the iron and steel trades complain that the reductions of the new tariff will ruin them; and just as when protective taxes are first imposed, those who pay them cry for corresponding protection for their own manufactures, so when reductions commence, those who suffer on what they sell cry loudly for reductions on what they buy, and in this way the working of a protective system becomes apparent. Meanwhile the working-man is likely to be discontented. He does not share in the profit which the taxes give to his employer, for his wages are determined mainly by the number of workmen available, and the real protection which he might logically claim—namely, an import tax on immigrants—is denied him."

I might multiply these extracts almost in-



**A Flood of Molten Metal.**—An accident of a serious nature happened at the Cleveland Rolling Mill, in Newburgh, last week. A converter in the Bessemer steel works, containing from seven to eight tons of molten metal, was suddenly overturned, owing to a sudden cessation of the hydraulic pressure by which it was being moved. The great mass of fiery liquid was poured into the pit beneath, exploding with great force. About 20 men were standing about, and all of them were more or less injured, some of them fearfully. Patrick Foley, a single man, was burned terribly by the wave of steam that poured out of the pit. Thomas Burgerino, who was standing near Foley, was also burned in the face so badly that he was hardly recognizable. Both were taken to the Charity Hospital, and it is hardly possible that Burgerino can live. The other nine men who were struck by the cascading wave are more or less injured, but none of them dangerously.





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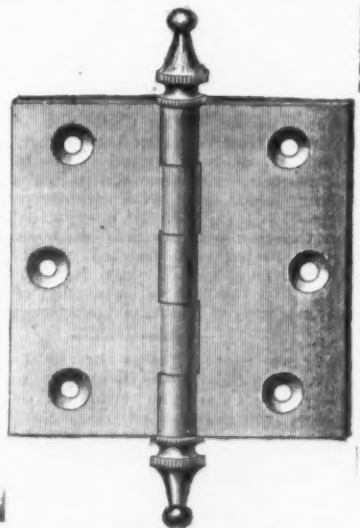
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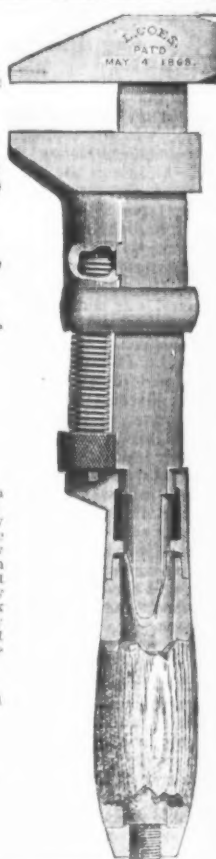
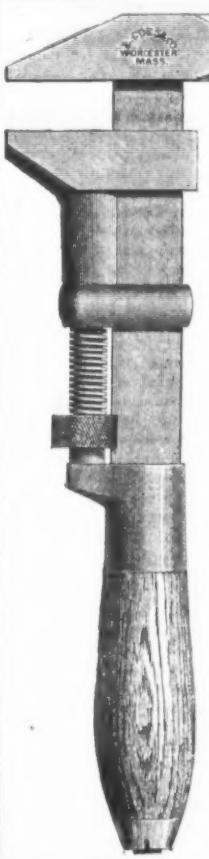
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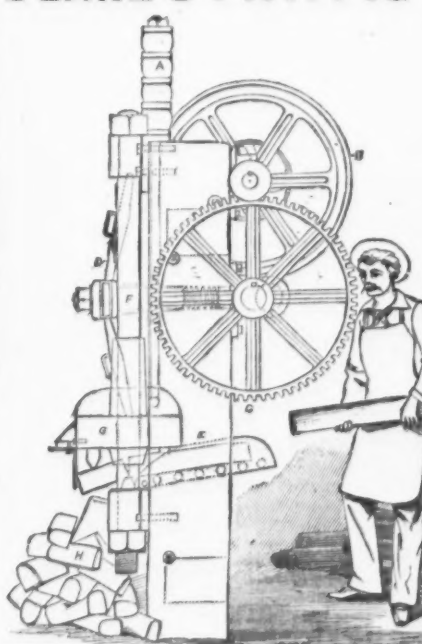


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Our improved  
**PATENT BORING MACHINE,**  
with our improved adjustable crank, by which a greater or less leverage is obtained, enables us to offer a machine that will perform its work with less labor than any machine heretofore placed the market.

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## Our Old Steam Vessels.

In his "Chronological History of the Origin and Development of Steam Navigation," which has just been published, Admiral George Henry Preble, already favorably known as the historian of the Stars and Stripes, gives some interesting notes on the early steamboats and steamships of New York and the neighboring waters. The first boat mentioned was that propelled by Samuel Morey from Hartford to this city in 1794. This, the sixth steamboat built in the United States, was a stern-wheeler, and made the voyage at the rate of five miles an hour, among her passengers being Chancellor Livingston, Judge Livingston, Edward Livingston and John Stevens. Morey, whose claims to the invention of the first successful steamboat must, however, give way to those of Fitch, always insisted that Fulton surreptitiously imitated his model. The seventh successful steamboat was the invention of John Fitch, and was tried under the patronage of Robert H. Livingston in the summer of 1796. It was 18 feet long and of 6 feet beam, and was steered at the bow with an oar. The boiler was a 10-gallon iron pot, with a plank lid, and the cylinders were of wood strongly hooped, the agent of propulsion being a screw propeller. The scene of the experiment was the Collect, a fresh-water pond long since drained and built over with Canal and other streets. In 1797 Chancellor Livingston built his steamboat on the Hudson, and obtained from the Legislature an exclusive privilege for one year on condition that he produced a vessel propelled by steam at the rate of three miles an hour. This, however, he and his associate, Nisbett, were unable to do, though they had as their engineer Brunell, afterwards distinguished as engineer of the Thames Tunnel. In 1798 the experiments of Nicholas J. Roosevelt for Chancellor Livingston and John Stevens assured the success of the steamboat through the adoption of vertical paddle-wheels over the sides.

On April 5, 1803, the New York Legislature passed an act granting the right and exclusive privilege of navigating all the waters of the State, by vessels propelled by fire or steam, to Livingston and Fulton, for a space of 20 years. Two years—the term was afterward extended to four—were allowed for the proof, which was to be the propulsion by steam of a 20-ton boat at the rate of four miles an hour, with and against the ordinary current of the Hudson. In May, 1804, Robert L. Stevens and the "Commodore" crossed from the Battery to Hoboken in a small boat with tubular boilers and two propellers. Its engines are still preserved, if we mistake not, in the Stevens Institute of Technology, at Hoboken. Fulton's more famous Clermont was, however, about to eclipse all the craft of the experimental era of steam navigation. The Clermont, which was launched in the spring of 1807 from the yard of Charles Brown, was 130 feet long with 18 feet beam and 6 feet hold, and took her name from the Chancellor's country seat. She resembled in model a Long Island skiff, and was decked for a short distance at stem and stern. The engine was built by Boulton & Watt, in England, 24 inches cylinder and 3 feet stroke, and the boiler was of the low-pressure pattern, 20 feet long, 7 feet deep and 8 feet broad. The boiler was set in masonry and the condenser stood in a large cold-water cistern, the weight of these appliances making it difficult to steer the vessel. The engine was open to view, and a house like that of a canal boat was raised aft over the boiler for the accommodation of the officers. The side-wheels were 15 feet in diameter, with buckets 4 feet wide and dipping 2 feet in the water. There were no wheel-guards, and it was a favorite trick of the skippers of the river craft to run foul of the unwieldy Clermont and carry off a wheel. The rudder was of the shape used in sailing vessels and moved by a tiller. The Clermont started from New York for Albany at 1 p. m. of August, 1807, with a few friends of Fulton on board, some mechanics and six passengers. There is no need to describe her successful voyage. It should be added, however, that ere the close of the season the wheels were surrounded by a frame of strong beams and the paddles were covered in, and the rudder was changed to the pattern now used on all river boats, and was worked by a wheel. During the winter of 1807-8 the Clermont was almost wholly rebuilt; her hull was lengthened and covered from stem to stern with a flush deck, and two cabins were formed beneath it, surrounded by double ranges of berths.

The Car of Neptune and the Paragon, vessels of 350 tons, were soon added to the Hudson River line, the Clermont having proved during her second season inadequate to the travel, though at the first there was no little prejudice excited against her because of the inconvenience of having to be on board at an appointed hour. A few days after the Clermont's successful trip, Robert L. Stevens put his paddle-wheel steamboat, the Phoenix, in motion on the Hudson. Being precluded from plying in New York waters, Stevens first employed the Phoenix as a passage-boat between this city and New Brunswick; then, in June, 1809, carried her under steam round to the Delaware and up to Philadelphia, where she was placed on the Trenton route. By 1813 we find the Hudson River steamboats regularly advertised, leaving New York on Tuesdays, Thursdays and Saturdays at 5 p. m., and Albany on the same days at 9 p. m. The through fare was \$7 and the way fare 5 cents a mile, the minimum charge for each passenger being \$1. In 1816 the Chancellor Livingston was constructed, a giant vessel of 490 tons, or almost one-sixth of the size of the Sound steamboats of to-day. With a strong wind and tide in her favor she could make 12 miles an hour. The Chancellor Livingston was broken up in 1834, after running for two years on the opposition line between Boston and Portland, and her engines were placed in the Portland, said to have been the first steamer that burned anthracite coal with success, the blower being devised for her by her engineer, Mr. J. B. Coyle, afterward president of the Portland Steam Packet Co. The honor of making the first successful experiments with hard coal is, however, claimed for Capt. W. W. Coit, founder of

the Norwich and New York Transportation Company.

On the 2d of July, 1812, the Jersey made her first trip between New York and Paulus Hook, the opening of this steam-ferry being celebrated with a grand banquet given by the Jerseymen. "On both shores were thousands of spectators viewing the pleasing object." The York was added to the line a year later, when the boats were supposed to make half-hourly trips from sunrise to sunset. Each of these ferry-boats was composed of two boats, each 80 feet long and of 10 feet beam, with the wheel and engines between the two. They were of the double-end pattern. An act of March 4, 1814, authorized William Cutting and others to run a steam-ferry between this city and Brooklyn, and the New York and Brooklyn Steamboat Ferry Association having been formed by Fulton and Cutting, the Nassau made her first trip in May. The fare was 4 cents, and the trip occupied from four to eight minutes, 40 crossings being made daily.

During the war of 1812-14, news from the army of General Scott was brought to the newspapers of New York by the arrival of the fast-sailing Car of Neptune in 24 hours from Albany. In October, Fulton launched the first steam warship, the Demologos, afterward named the Fulton the First. She was 150 feet long and 55 feet beam, mounting 30 long 32-pounders and two 100-pounders. Her general idea was that of the ferry-boats, being a double-end, with the wheel and engines in the central space between the two vessels of which she was composed. According to the veracious and unexcited correspondent of a Scotch newspaper of the period, her sides were 13 feet thick, and her engines were so arranged that if an enemy attempted to board he would instantly be scalded to death by a pump discharging 100 gallons of boiling water a minute, or transfixed by 300 heavy iron pikes of great length darted from her sides with prodigious force every quarter of a minute, and chopped into mince-meat by 300 cutlasses brandished over the gunwales by mechanism with the greatest regularity. Luckily for the British the war was soon brought to an end, and the Fulton the First had an uneventful existence as a receiving-ship at the Brooklyn Navy Yard until she was blown up, June 4, 1829.

On the 28th of September, 1816, the Connecticut, Captain Bunker, arrived in New York after a 21 hours' passage against wind and tide from New London. In October a regular line commenced making semi-weekly trips to New Haven. Not until 1821 was an excursion made to Providence, R. I., on the Robert Fulton, and the regular line was only established July 12, 1822, semi-weekly trips being made by the Fulton and Connecticut. The New York Legislature had granted great privileges to the Livingston and Fulton Steam Navigation Co. Without a license from the company no steam vessel was allowed to navigate the Bay, the Sound, the North River or any of the lakes or rivers of the State, and the Connecticut Legislature, in turn, had excluded from Connecticut waters all vessels bearing such a license. The Connecticut, it has already been said, was plying between New York and New Haven, in opposition to the packet lines, and the owners of the packets had influence enough to drive her and the Fulton away from Connecticut ports. This enactment led to the formation of the great Sound steamer line. The packet owners were both enterprising and successful, and had already driven the Firefly off of the Newport-Providence route by carrying passengers for 25 cents—no pay if sails did not beat steam. Her retirement was greeted by a mass meeting of triumphant packet men, who denounced interlopers and drank "confusion to steamboats." The departure of the weekly packet for New York was in those days an event of no little importance. Passengers came on board the beautifully-modeled sloops of from 75 to 100 tons capacity, accompanied by their relatives and friends, and the captain's stately decanters having been set out on the mahogany dinner-table in the cabin, a solemn health was drunk to the prosperity of the voyage. The fare was \$10, including meals. Sometimes a flying vessel like the Huntress made the run in 18 hours; at times the passage occupied a week. Over the cabin stairs hung the mahogany letter-box, and on the arrival of the packet there was a rush to get letters in advance of the slow mail plodding over the post roads, and the captain, having distributed his mail, produced the decanters once more, that the correspondents might drink his health. Quincy records how, only a few months later, on the Sound boats, decanters of brandy were set out along the tables at meal-time for each passenger to drink all that he liked, or all that he could.

The Connecticut was a white boat with green trimmings, had a square engine, and cost \$80,000. The Fulton was the first steamboat built expressly for Sound navigation, and was enormously strong, but had little less machinery than is now put in a cotton mill. Her wheels were turned through a cog-wheel with teeth 5 inches long, and she made a terrific noise when in motion, but moved so slowly that she was once five hours going from Providence to Newport. Her color was black, and she had sails to help the steam. Neither boat had upper saloon, staterooms or hurricane deck. Both burned pine wood under large copper boilers kept polished to the last degree of brightness. The wood necessary to keep steam up was piled everywhere, fore and aft, above the guards, and left very little room for freight. When coal was introduced the old copper boilers paid for the new iron ones. Against these formidable competitors the packet men vainly endeavored to array the Rhode Island Legislature, a bill to tax passengers being rejected, and another to restrict their landing on the soil of the State indefinitely postponed. Then they surrendered to the inevitable.

In 1819 the Savannah, built at Corlears Hook by Crocker & Fickett in the preceding year, made the first voyage across the sea, going under canvas to Savannah, and sailing thence for Liverpool May 26, making the passage in 25 days, during 18 of which her engine was employed. She had a jointed shaft and paddle-wheels constructed to fold up like fans and be laid on the deck when not in use. In this same year the Robert Fulton, a vessel of 700 tons, ship-rigged, but furnished with a steam engine, began

plying between New York, Charleston, Havana and New Orleans. In 1829 the directors of the Chancellor Livingston Steam Packet Co. raised a tremendous storm on the Sound by prohibiting the stewards from placing decanters of brandy and spirits on the tables—indeed, they had to publish a letter explaining that they were incited to their action by a desire to help the cause of reform rather than by "petty motives of economy or gain," pointing out that the tables were still supplied with an abundance of good red wine. "In addition to all this, whenever any person may choose to order brandy or spirits from a belief of their necessity, it will be immediately and cheerfully supplied from the bar, and the gentleman will hear no more about it, unless he pleases." In 1832 Robert L. Stevens conceived the idea of his famous iron-armored battery, begun in 1833 to be laid aside in 1854, and finally to be sold in 1880 as old iron. In the same year Dr. Junius Smith formed the more practical and pregnant idea of the British and American Steam Navigation Co., having become convinced, after a 32 days' passage from New York to Plymouth that any ordinary sea-going steamer would have run it in 15 days with ease. He was scouted as a visionary, much as Cyrus Field was when not so very long afterward he assailed the capitalists of both countries with his cable scheme; the packet owners opposed him; the Duke of Wellington declined to countenance "any scheme which had for its object a change in the established system of the country." But the company was formed, and the British Queen, a gigantic "steam frigate" of 2400 tons, was contracted for. Pending her completion the Sirius was dispatched from Cork, April 4, 1838, reaching New York on the 23d, along with the Great Western, which had sailed from Bristol on the 8th.

In 1837 Ericsson had established the feasibility of the screw-propeller system with the Francis B. Ogden, which Sir William Symonds, Surveyor of the British Navy, declined to approve, "because, the power being applied in the stern, it would be absolutely impossible to make the vessel steer." Captain Robert F. Stockton, United States Navy, had more confidence and ordered the inventor to build two iron boats for him on the rejected model. The R. F. Stockton crossed the Atlantic under sail early in 1839, and permission having been granted by Congress to run her in American waters, she was renamed the New Jersey and employed on the Delaware and Schuylkill as a tug. Ericsson came over in the autumn of 1839 and built the war steamer Princeton, fitted with the screw propeller and having her engines placed beneath the water-line. What, by the way, became of "the quicksilver ship," the steamer Columbus, built for the Transatlantic trade in 1838, in which the heat of the furnace was applied to the pan of quicksilver, water being thrown therein, and instantly converted into superheated steam?

The first steam-whistle used on a steamboat was that placed upon the King Philip, plying between Fall River and Providence, by Stephen D. Collins, in 1837. In 1847 a trial between the Great Western and the Princeton proved the great superiority of the screw propeller. Steam propellers, carrying some passengers, but being mainly intended for freight, began navigating the Sound in the same year, the pioneer vessel being the Quinnebaug. The first iron passenger steamer to ply on the Hudson was the Iron Witch, built by Ericsson for Captain R. B. Forbes in 1845, but she proved a failure, and her engines were put into the Falcon, a wooden steamer, the first to carry the American flag to Chagres in connection with the California route. The California, which sailed from New York October 6, 1848, was the first to bear the Stars and Stripes to the Pacific Ocean. The American paddle-wheel steamer Golden Age, when she arrived at Liverpool in 1853, attracted much attention, from the fact that she had no bowsprit. April 23, 1855, Perry's flagship, the Mississippi, arrived at the Brooklyn Navy Yard, having been the first war steamship of the American navy to circumnavigate the globe.

**Belgian Steel Works in 1881.**—In the year 1881 there were three steel works in Belgium, all active, and all in the Province of Liège, with 16 Bessemer converters, three of which were idle. There were also 26 heating furnaces in operation and three idle, and the number of hands employed amounted to 2506. The raw pig consumed was 79,072 tons of native, and 66,310 tons of foreign, together with 13,373 tons of steel scrap. This quantity yielded 141,640 tons of ingots, valued at about \$3,287,000. With 120,897 tons of native and 1714 tons of foreign ingots, the following finished products were turned out: Rails, 87,047 tons; tires, 11,361 tons; rolled steel, 8690 tons; hammered iron, 10,207 tons; thick plates, 1748 tons; thin plates, 184 tons; total, 119,237 tons. This quantity, however, does not include the steel wire made by the Angleur Co., particulars of which have not been furnished.

Quite a number of our charcoal iron works, says the *Journal of the Charcoal Iron Workers*, carry a fixed amount of insurance against fire on cord wood cut and raked, and in several instances remuneration for damages has been obtained. The losses to which the owners of woodlands are subjected form a considerable item in their cost of maintenance, and the expense of fighting forest fires annually augments to a large sum to many iron works. The only available methods to reduce this outlay and loss is to secure rigid enforcement of existing laws, or obtain greater protection by enactment, and to be well prepared to fight fires when they occur. This is the time to take precautionary measures against fire. In three months many may be too busy fighting fire to perfect any arrangements.

The British Iron Trade Association reports that in 1882 the total production of Bessemer steel ingots in the United Kingdom was 1,673,649 gross tons, an increase of 231,930 tons on the production of the previous year; the production of Bessemer steel rails was 1,235,785 gross tons, an increase of 212,045 tons on that of 1881. The make of open-hearth steel ingots was 436,000 gross tons, against 338,000 tons in 1881.

## LATE PUBLICATIONS.

**Preble.—History of Steam Navigation.** By Rear Admiral George H. Preble, U. S. N.; 483 pages, large 8vo, cloth; 1883 . . . \$3.50

This work is a chronological history of the origin and development of steam navigation from 1543 to 1882. As the author states in his introduction, he has not followed all the inventions and improvements that have intervened. He gives a complete account of the early experimenters, their attempts and what they accomplished; but the main part of the book is devoted to the first practical use of steam as a motive power for vessels at the beginning of the present century, and shows the progressive advancement to the present time. All the important facts relating to marine engineering in all parts of the world are chronicled, and in this particular alone the work is valuable for reference to engineers and others interested. Recent novel inventions and experiments are discussed, and the work includes an appendix of valuable data. The author has gathered a vast amount of matter from original sources which are not generally accessible.

**Larden.—A School Course on Heat.** By W. Larden; illustrated, 321 pages, half roan; 1883 . . . \$2

This is a well-arranged treatise, especially adapted to young engineers and those who have no previous knowledge of physical science. Among its contents are chapters on the expansion of solids and liquids, ebullition, conduction, radiation and vaporization. There are also practical remarks on the mechanical theory of heat and heat engines. The mathematical portions are treated at length and in a very careful manner.

**Perry.—Practical Mechanics.** By John Perry, M. E.; 148 illustrations, 271 pages, 12mo, cloth. London, 1883. . . . \$1.50

This book is a well-arranged explanation of the principles of mechanics, and to understand and comprehend its contents requires no more scientific knowledge than any intelligent mechanic should have. The work is designed for the use of those who are not trained mathematical students. The author is clear and concise in his statements and illustrations, and the whole subject is treated in a satisfactory manner.

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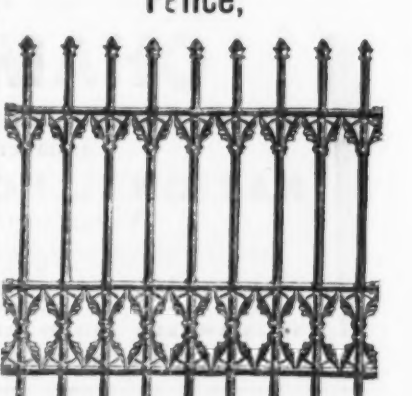
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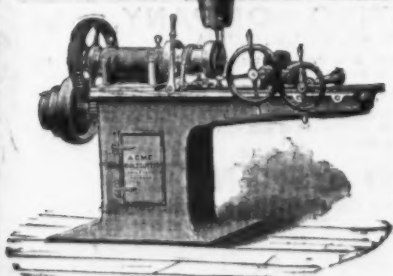
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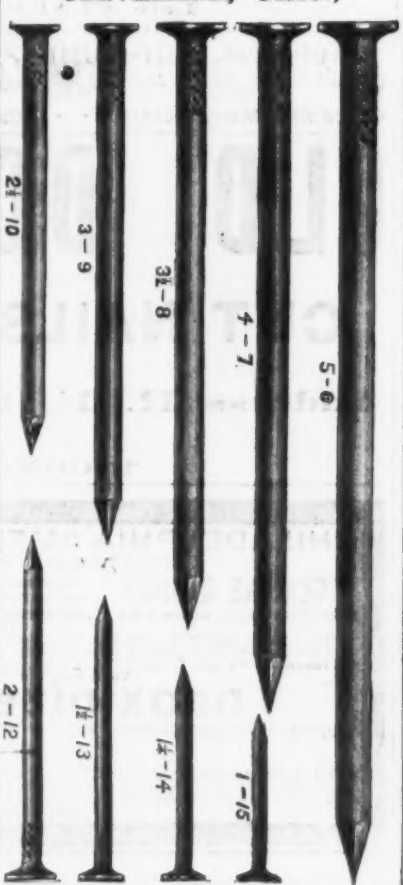


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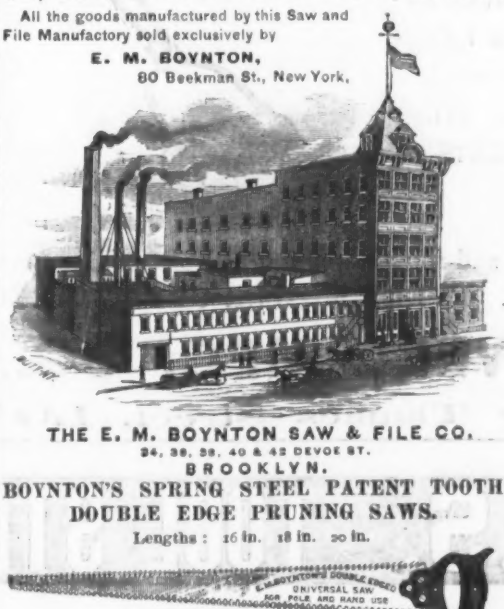
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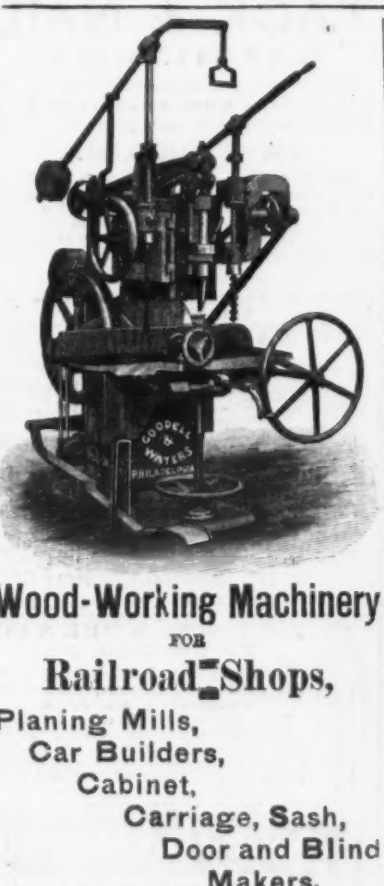
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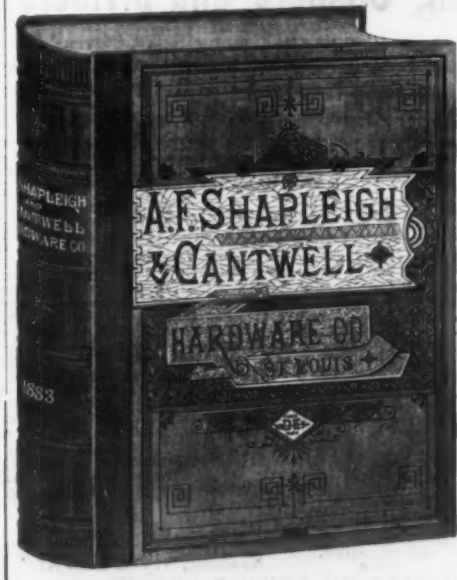


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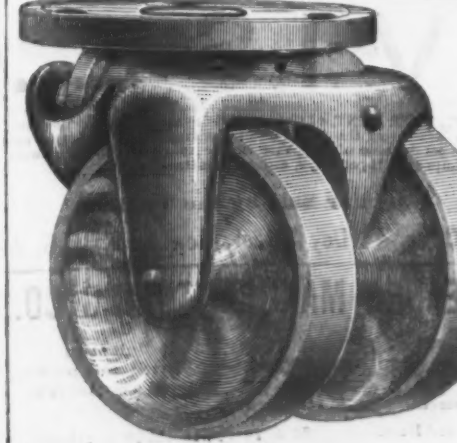
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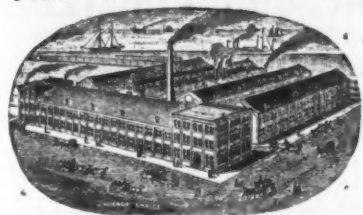
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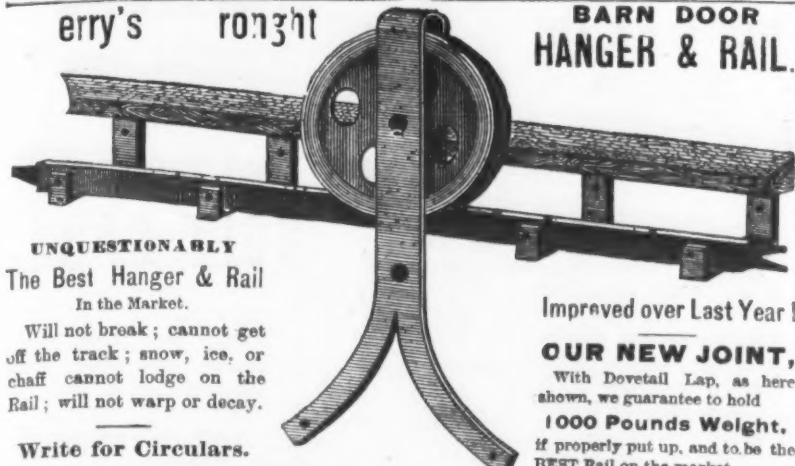


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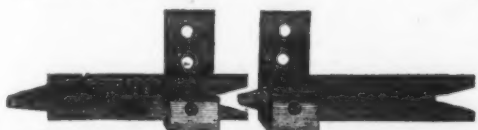
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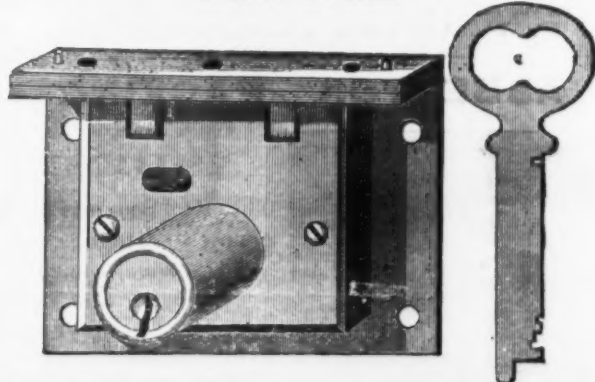
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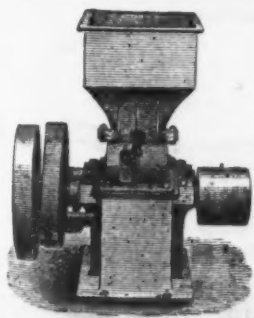
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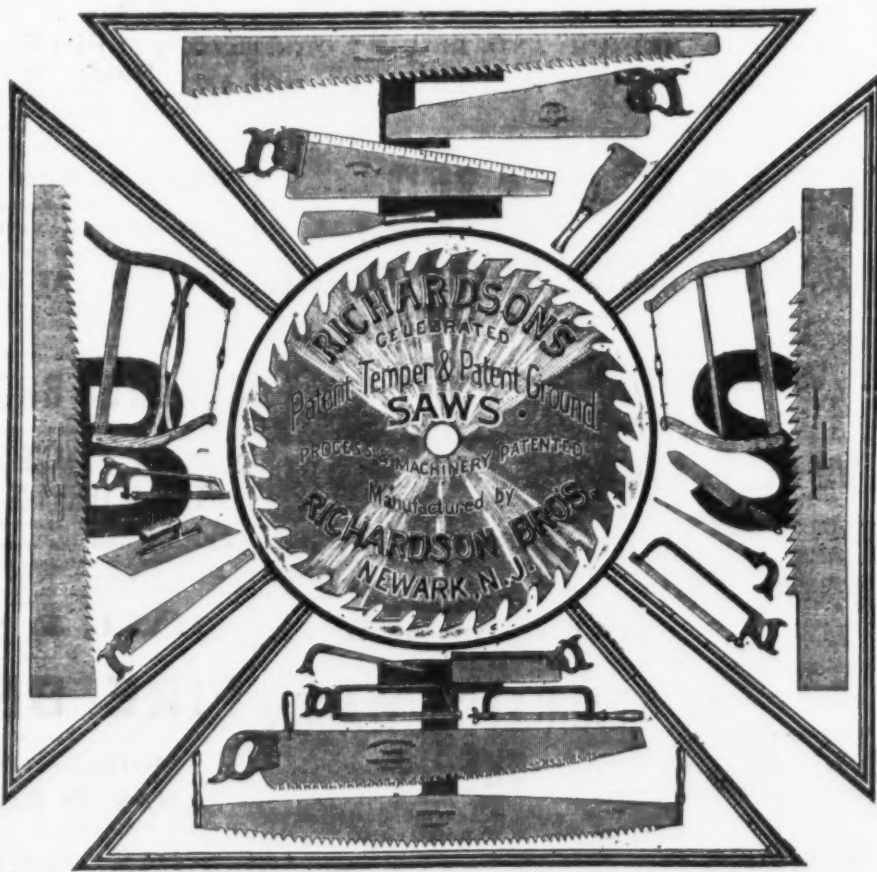
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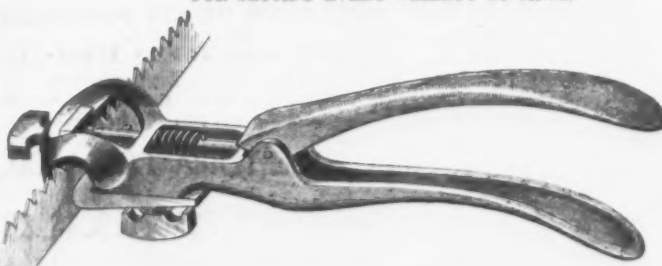
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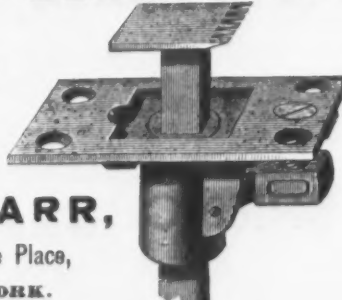
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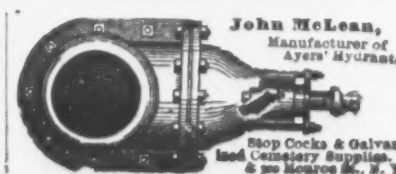


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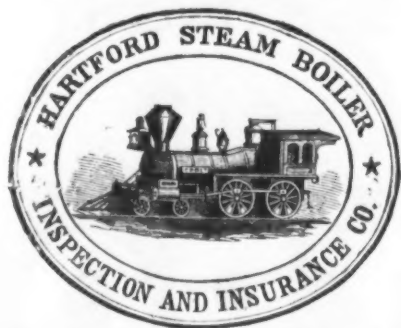
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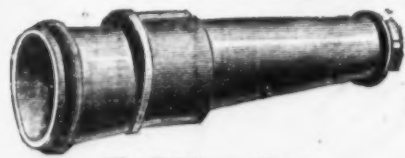
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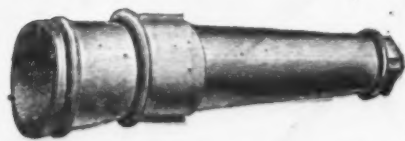
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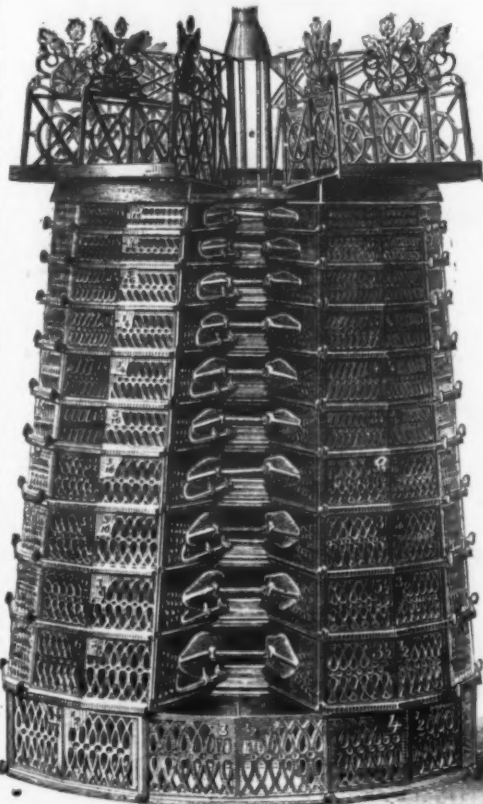
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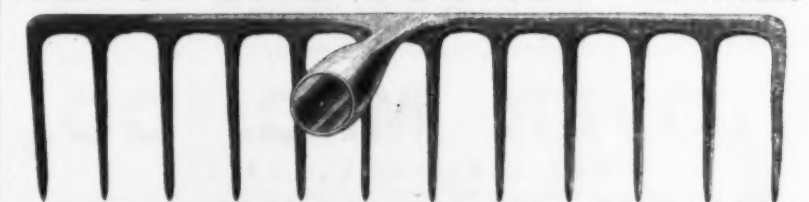
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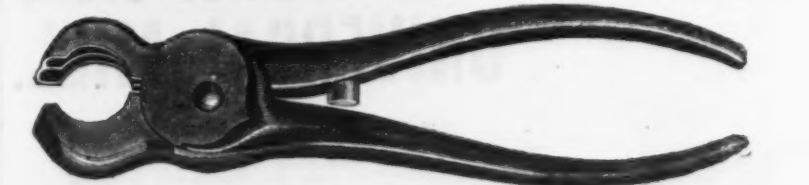
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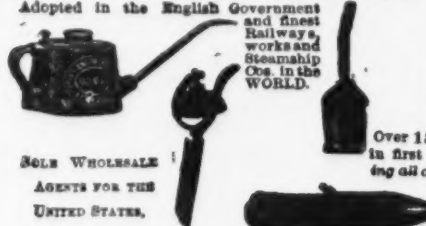
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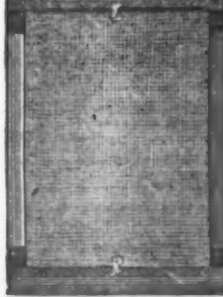
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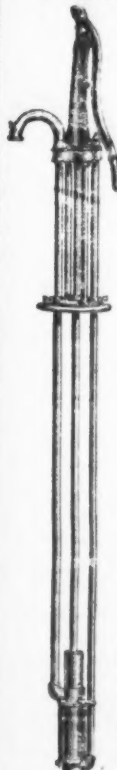
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Vacuum Chamber and  
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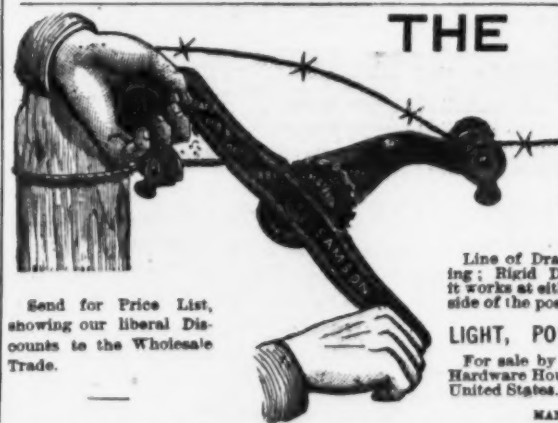
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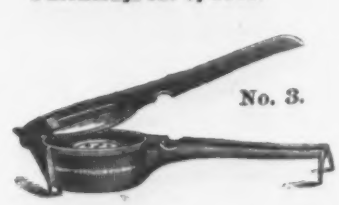
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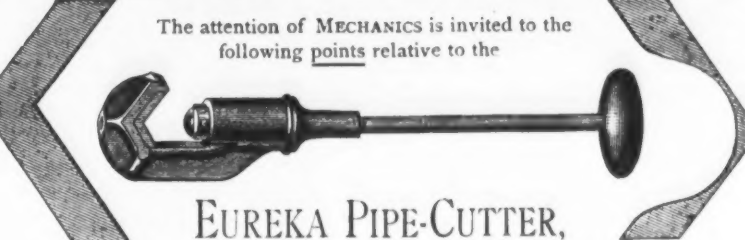
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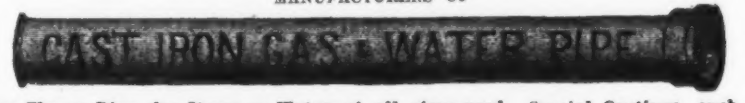
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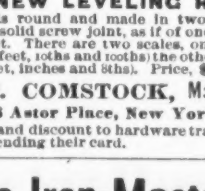
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above mentioned, for smelting and refining pur-  
poses. The object being to make it at once a con-  
venient, practically useful, and comparatively inex-  
pensive adjunct to the Furnace, Forge and Rolling  
Mill.

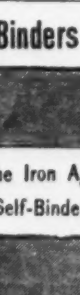
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For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will corre- spond with those for the constituents of an ore.	
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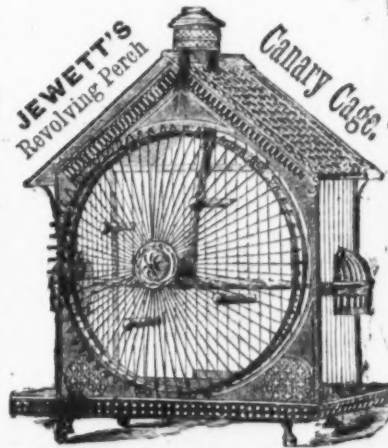
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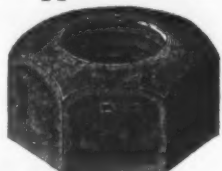
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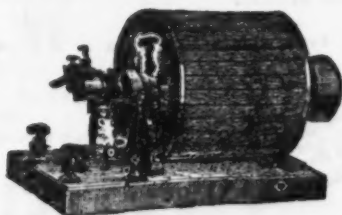
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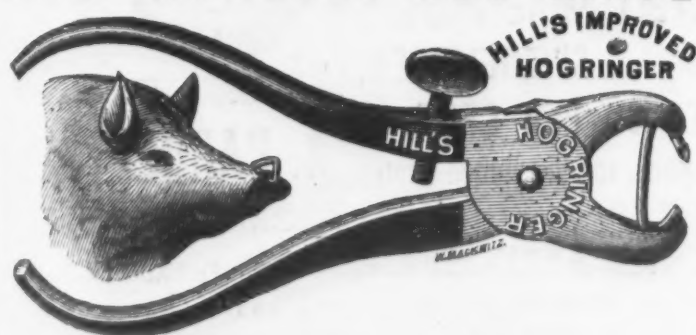
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Protoxide Iron .....	23.02	Carbonic Acid .....	—
Protoxide Manganese .....	.32	Phosphoric Acid .....	.37
Alumina .....	3.27	Titanic Acid .....	—
Magnesia .....	.76	Sulphur .....	.58
Lime .....	1.65	Soda .....	—
		Water, &c. ....	—
			53.31 %
Metallic Iron .....	24.		
Metallic Manganese .....	16.		
Phosphorus .....	—		

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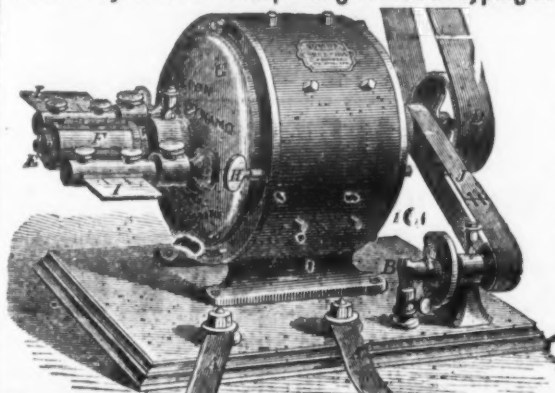
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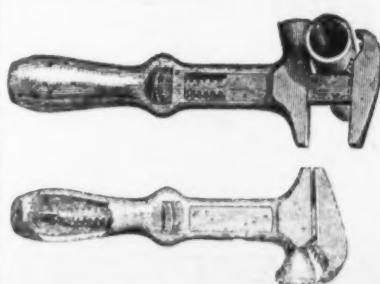
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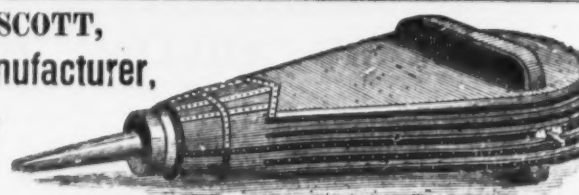
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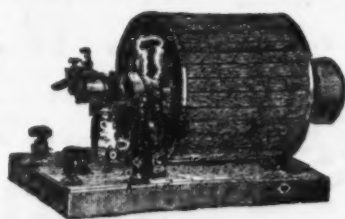
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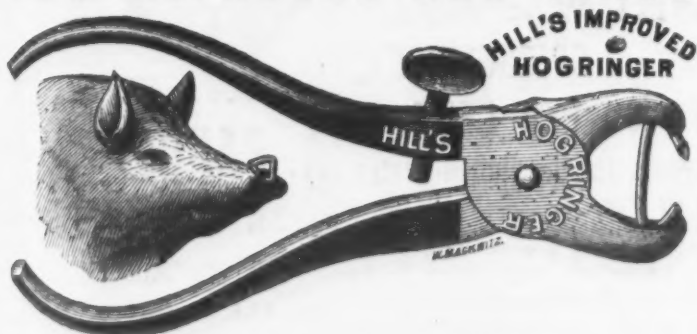


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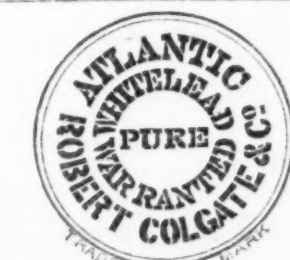


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Paxton Furnace, Pa.  
Spearman Iron Co., Pa.  
Etna Iron Works, Ohio.  
Milton Coal and Iron Co., Ohio.  
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Moss & Marshall, Ohio.  
H. Campbell & Sons, Ohio.  
Hocking Valley Iron Co., Ohio.  
Cleveland Rolling Mill Co., Ohio.  
Meier Iron Co., Ill.  
North Chicago Steel Co., Ill.  
Union Iron and Steel Co., Ill.  
Means & Culbertson, Ky.  
Ashland Furnace Co., Ky.  
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THE ALL MINES. McCOLLUM MINES.

**BREWSTERS, Putnam Co., N. Y.**

AVERAGE ANALYSIS.

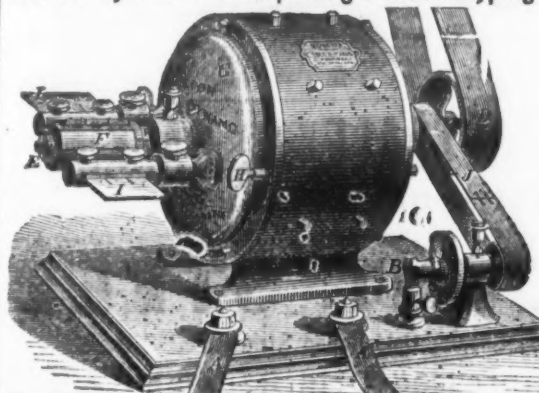
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Protoxide Iron	23.02	Carbonic Acid	—
Protoxide Manganese	.32	Phosphoric Acid	.37
Alumina	3.27	Titanic Acid	—
Magnesia	.76	Sulphur	.58
Lime	1.65	Soda	—
		Water, &c.	—

Metallic Iron 53.31 %  
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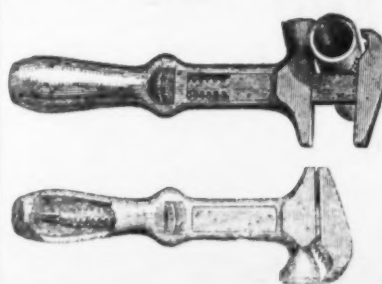


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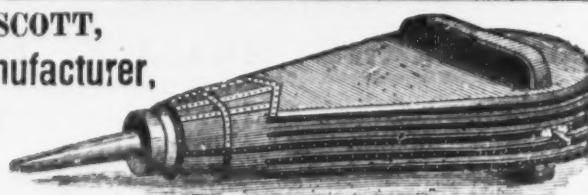
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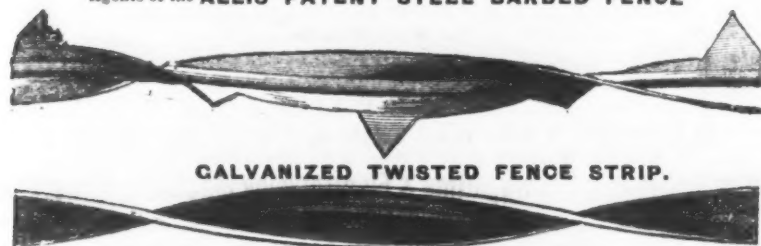
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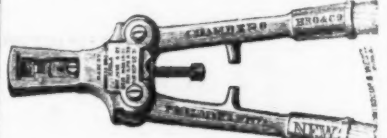
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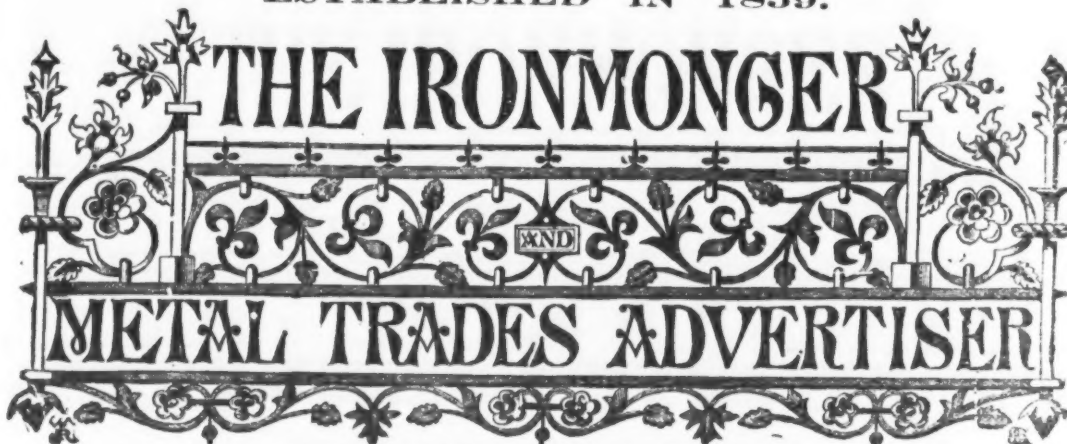
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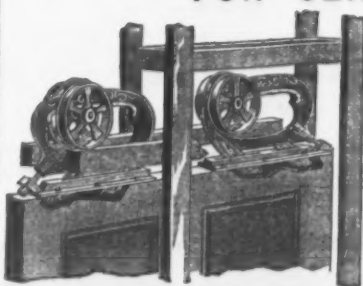
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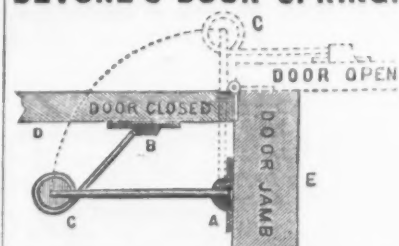
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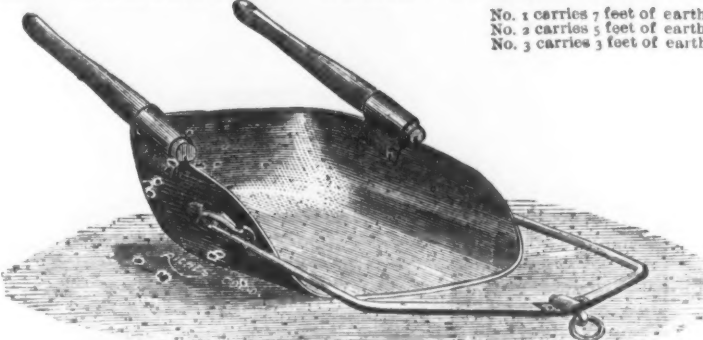
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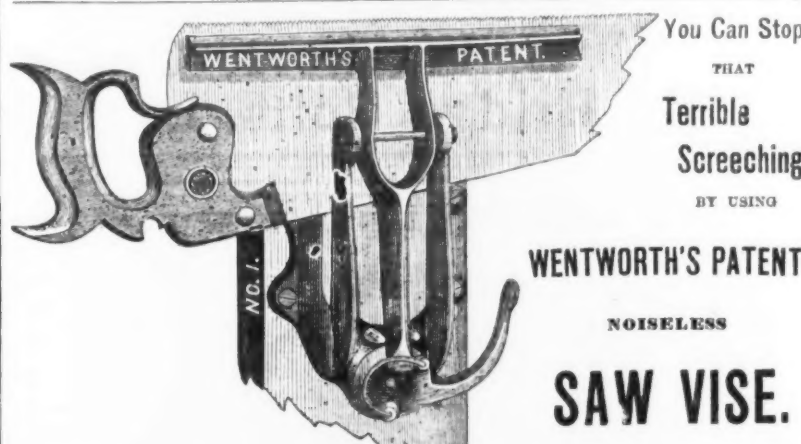


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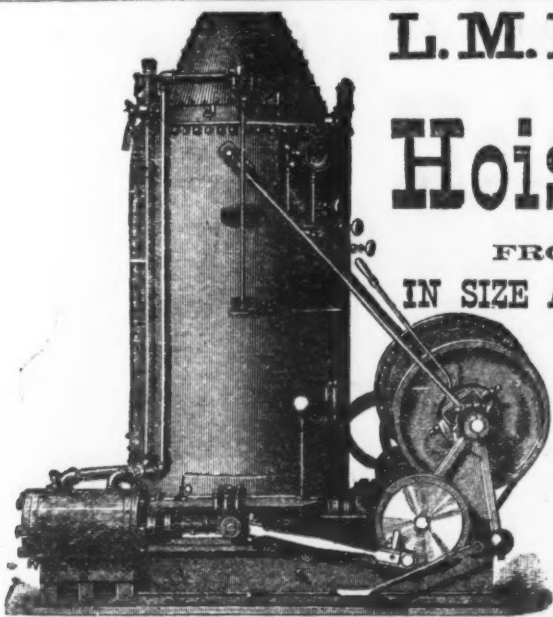
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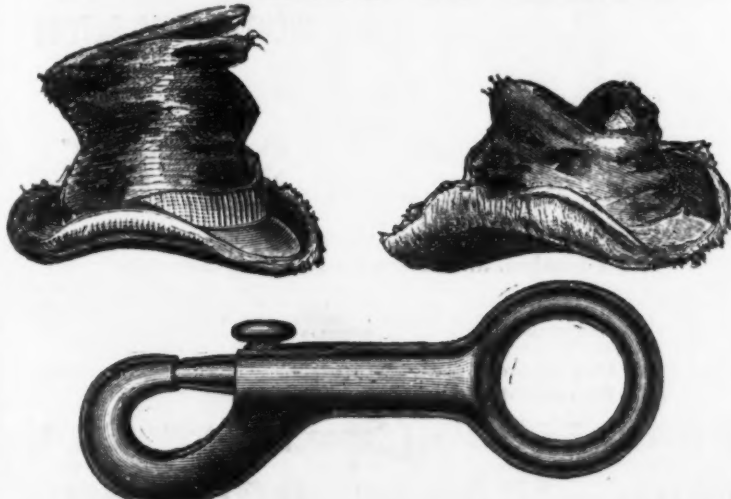
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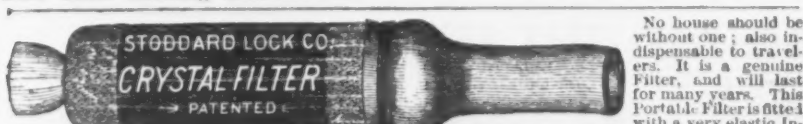
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Saws 12 inches wide. Both

wheels are adjustable, the up

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are bolted on the frame, and

the wear can be taken up. The

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The tight and loose pulleys are 12 inches in diameter,

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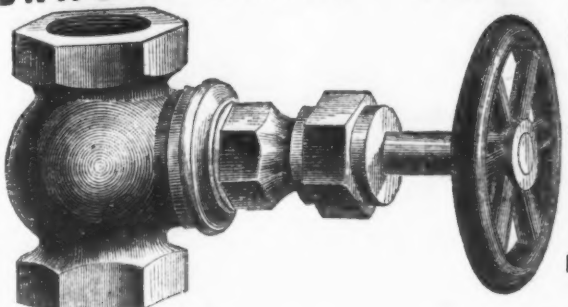
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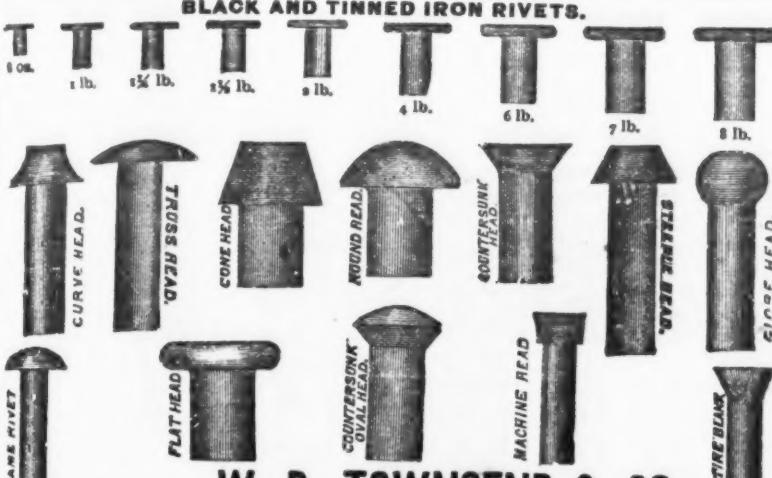
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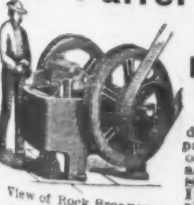

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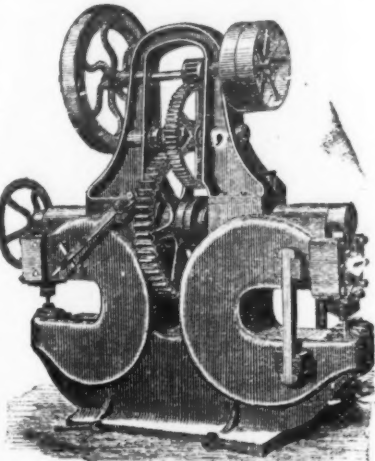
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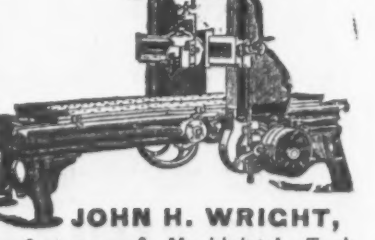
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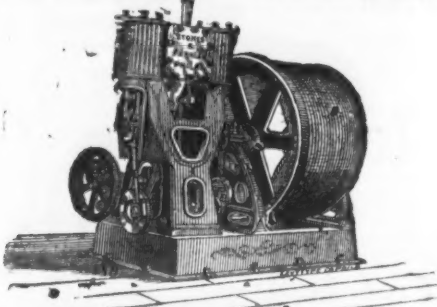


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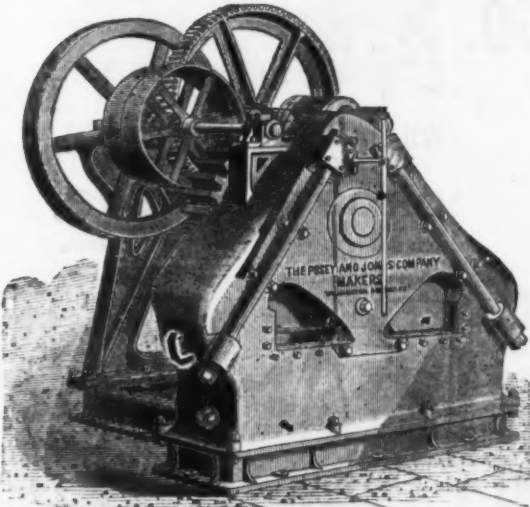
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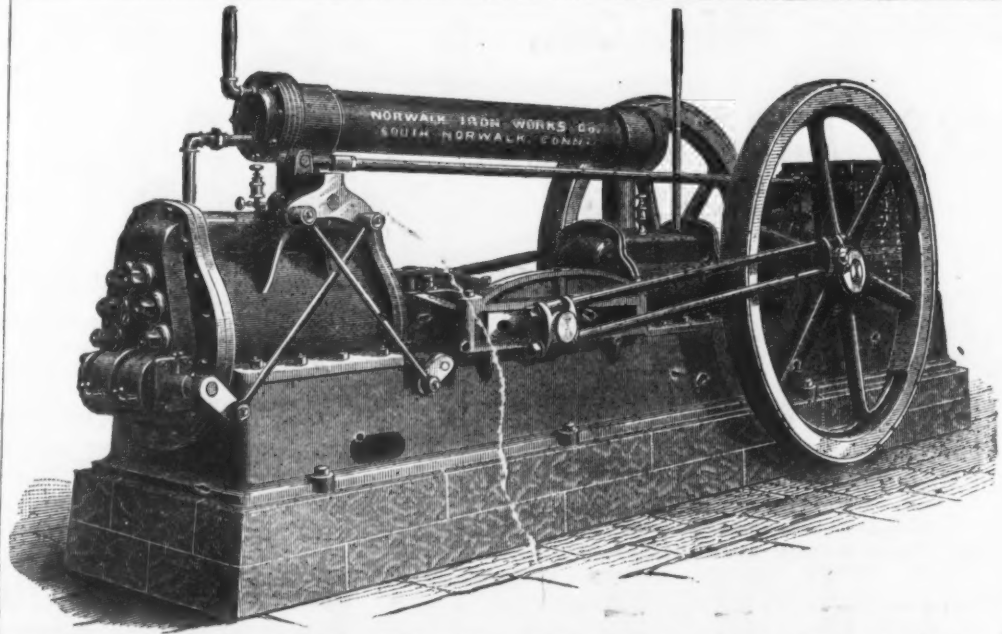
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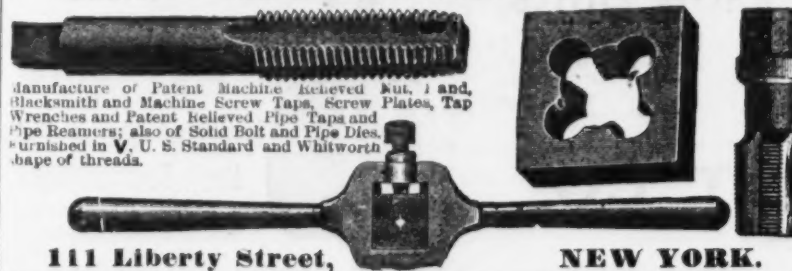
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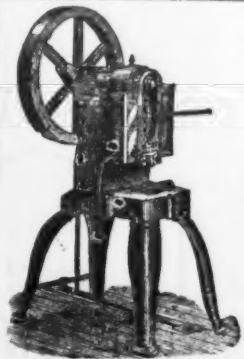
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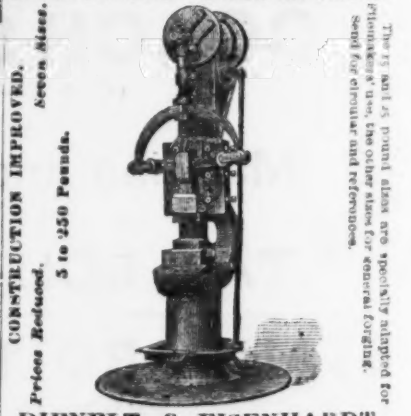
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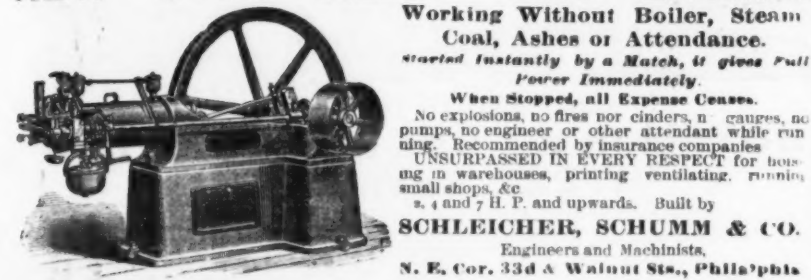
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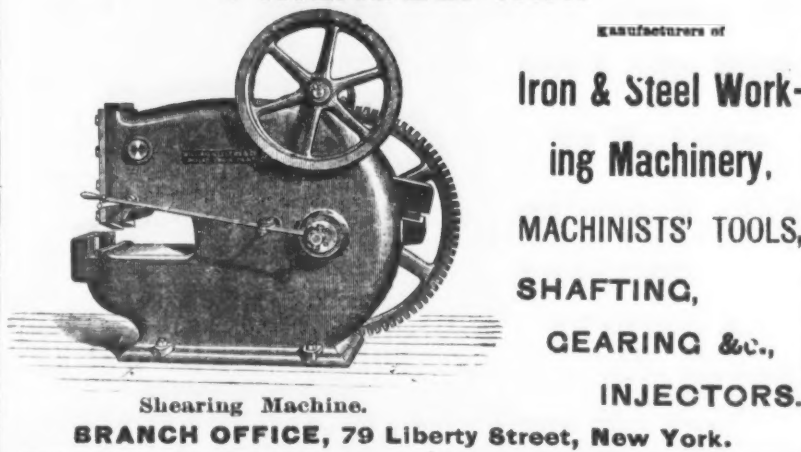
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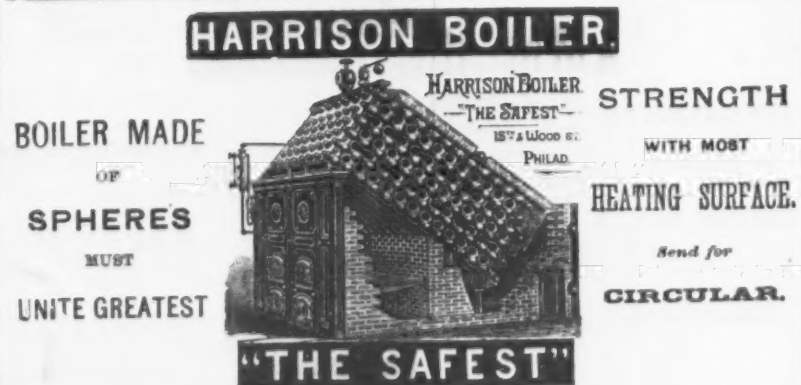
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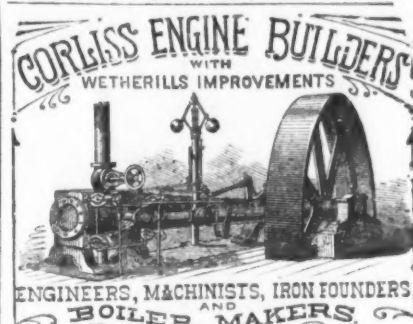


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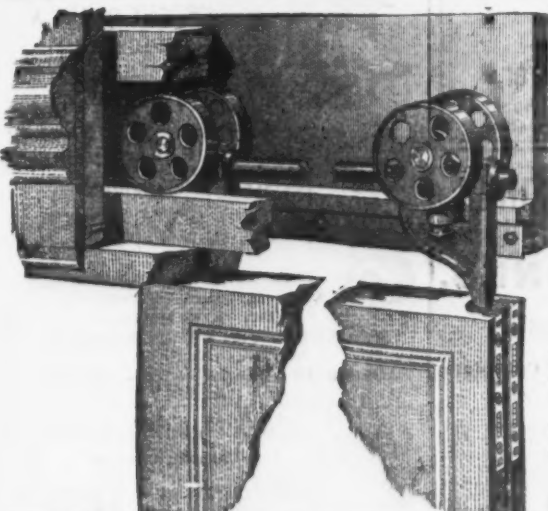
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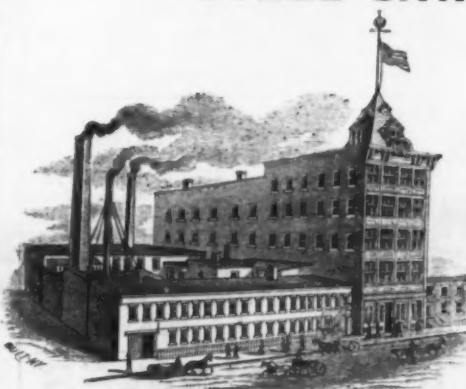
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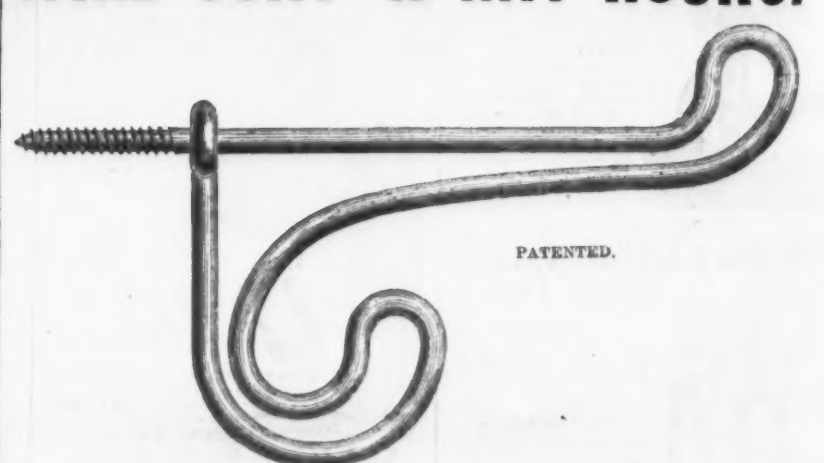
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